Sound Management of the Panama Canal Watershed

The Role of the Inter-Institutional Commission of the Panama Canal Watershed (CICH)

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Preamble

This document, "Sound Management of the Panama Canal Watershed: the Role of the Inter-Institutional Commission of the Panama Canal Watershed (CICH)," consists of two papers; an Executive Summary and a Summary Report, with Appendices.

The Executive Summary is directed towards the wider, more general audiences, including policy-makers, interested members of the civil society and the media. It provides a wide perspective of the issues surrounding the management of the Canal Watershed, as well as presenting the background, justification and key recommendations for the establishment and formulation of the CICH. The Executive Summary serves as a comprehensive introduction to the Summary Report.

The Summary Report addresses key strategic, institutional, legal, and financial issues related to the CICH. Emphasis is placed on the importance of defining well the CICH's mission and mandate. This paper is directed to managers of entities such as the *Autoridad del Canal de Panamá (ACP)* and CICH member institutions as well as other parties with an immediate stake in management of the Panama Canal Watershed.

As an aid to high-level discussions, the Summary Report delves into the complex issues surrounding management of the Panama Canal Watershed, including:

(a) formulation of a strategic vision for the CICH;

(b) potential institutional conflicts and possible alternative coordinating mechanisms;

(c) legal ambiguities;

(d) possible need to reassess certain government policies and policy instruments, including the Regional Plan;

(e) the need for greater stakeholder representation and civil society participation in the CICH;

(f) alternative funding arrangements; and

(g) achieving sustainable economic development of the Watershed.

This document is intended to serve as a reference document for key discussions regarding the CICH operations and serves as an important input into the eventual

CICH's Organizational Manual. To that end, a set of draft "CICH By-Laws" or internal operating procedures is included to this process.

The Summary Report also includes, as appendices, eight papers that were developed to serve as discussion documents to help establish more fully the context for, and focus attention on, major organizational concerns facing the CICH. These include:

Appendix 1: Draft CICH By-Laws

Appendix 2: Preliminary Strategy for Management of the Panama Canal Watershed

Appendix 3: CICH Role and Functions

Appendix 4: Preliminary Financial Plan for the CICH

Appendix 5: Preliminary Analyses of Environmental Data Management System for the CICH and Participating Agencies

Appendix 6: Analysis of Legal and Institutional Issues for the CICH

Appendix 7: First-Year Action Plan for the CICH

Appendix 8: Analysis of Inter-Agency Watershed Entities

Executive Summary

Sound management of the Panama Canal Watershed (PCW) is crucial for the continued operation of the Panama Canal as well as the well being of the 1.5 million residents living in its surrounding metropolitan centers. In the coming years, national and international attention will be firmly fixed upon the *Autoridad del Canal de Panamá* (ACP) as guardian of the PCW. The Authority's successful response to this challenge must include serious commitment to the protection of the Watershed.

Following an overview of the Watershed's environmental status and its current management apparatus, this paper discusses the new, and comprehensive environmental mandates of the *Autoridad del Canal de Panamá* (ACP) with respect to watershed management. The paper presents the ramifications of these responsibilities and the particular need to coordinate with the various entities which cooperate in the Watershed. As an instrument of coordination, the ACP will rely upon the nascent *Comisión Inter-Institucional de la Cuenca Hidrográfica* (CICH). This paper explores CICH from the perspectives of its functions, possible organizational modalities and requirements. Finally, the paper concludes with a recommended agenda for action.

State of the Watershed[1]

Maintaining the natural vitality of the Panama Canal Watershed is of critical importance to Panama. It is the water supplied by the PCW that fills the locks of the Panama Canal. In addition, the Watershed provides potable water for 1.5 million people, furnishes hydro-electric energy, and supports a unique range of tropical biodiversity.

The Panama Canal Watershed (PCW) is a legally defined area that covers more than 500,000 hectares. It encompasses the various watersheds and river catchments that supply the current and future water requirements of the Panama

[1] This Section draws heavily from the findings in Heckadon-Moreno, Stanley, Ibáñez, Roberto and Condit, Richard, "La Cuenca del Canal Deforestación, Contaminación y Urbanización", USAID/ANAM/Smithsonian, 1999. For greater detail, one may refer to the book and its series of supporting documents.

Canal. The PCW stretches across the country from the Atlantic to the Pacific coasts, connecting the country's two most dynamic metropolitan centers, Panama City and Colon. The PCW is located at the national economic epicenter of Panama, the site of intense residential and commercial development.

Until 1999, the Panama Canal Watershed covered an area of 326,000 ha. That corresponds to the watershed that supplies the flow of water into Lakes Alhajuela and Gatun. In light of the growing demand for water, both for Canal operations, and residential and industrial uses, Law 44 of August 1997, extended the Watershed westward to cover an additional 225,000 ha. Today, the "extended" Watershed includes 552,761 ha.

Beginning in the early 1980's concerns about the need to protect the fundamental resource for the continued operation of Panama's principal economic asset, the Canal, led to several actions to protect and monitor the PCW. The Panamanian government began to expand its official protection of forested areas in the PCW (see Table A). As a result, most of the Watershed's remaining forested areas are currently under official protection.

Since September 1997, the Monitoring Project of the Canal Watershed (PMCC), under the sponsorship of the Smithsonian Tropical Research Institute (STRI), the National Environmental Authority (ANAM), and the U.S. Agency for International Development (USAID) has been monitoring the environmental status of the Watershed's soil, water and other resources.

The PMCC's findings, published in 1999, revealed that in the primary rivers of the "traditional" Watershed with good forest protection, the rates of sedimentation have decreased and the year-round water flows are regulated. Unfortunately, the conditions of some secondary rivers that flow into Lake Gatun, which supply half of the Watershed's water, are disquieting. These rivers have relatively little forest protection; housing projects have proliferated along the Trans-Isthmian corridor between Panama and Colon. Consequently, sedimentation rates have increased and inter-seasonal water flows are irregular.

Table 1 Watershed and Protected Areas

Name	Area (ha.)	Year Est.
	National Parks	
Caminos de Cruces	4,000	1992
Altos de Campana	2,630	1977
Chagres	129,000	1984
Soberanía	22,104	1980
	Recreational Areas	
Gatún Lake Recreational Area	348	1985
	Natural Monuments	
Barro Colorado	5,400	-----
Total Protected	167,420.75	
	Watershed	
PRE-1999	326,000	
Additional	225,000	
Total	552,761	
	Protected Area	
Estimated Protected Area in Watershed	32%	

Source: Dirección Nacional de Áreas Protegidas y Vida Silvestre, ANAM. 1998

In addition, PMCC states that the tropical soils of the Watershed, low in organic material, have little margin for error. Conditions, deviating from the norm even slightly, for example, unseasonable rainfalls, immediately stress the Watershed. With heavy rainfall, the Watershed is unable to contain sediment runoff and under dry conditions, the Watershed lacks the reserve necessary to maintain normal water levels of the lakes that serve as reservoirs for Canal operations.

Panamanians have been fortunate to have enjoyed the highest quality drinking water from the Chagres River and its lakes. Water quality entering treatment plants is still good. However, contamination is increasing as evidenced by the increased aquatic vegetation in a growing number of rivers. Some are in danger of no longer being suitable even for recreational purposes.[2] Direct disposal of untreated industrial and residential wastes into certain smaller rivers is of concern, subject to lax environmental and zoning controls, and, at the same time, intense population growth.

[2] According to Guillén, Leyson and William McDowell, "El Impacto del Desarrollo Agro-Pecuario, Forestal y Ubano en los Suelos y Aguas de la Cuenca del Canal" IRG, February, 2000, these recreational areas include the Manteca River as well as the recreational areas of Caimitillo Centro above the Chilibrillo River.

As a result of the negotiations of the 1977 Canal Treaties, although the Watershed was in no immediate environmental danger, foresight provoked Panamanian political leaders to implement important measures to protect the Watershed. Expanses of forest land were placed under government management as National Parks, precluding their commercial development. In light of the Watershed's increasing population, (from 21,000 in 1950 to an estimated 150,000 today), these preventive measures, aimed at restricting the spread of agricultural, residential and industrial development into the forests that protect the Watershed's primary rivers, were prudent and are, in large part, responsible for the relatively stable condition of the PCW.

The PCW's relatively good state could easily induce complacency, leading to the very real danger of greater relaxation of environmental regulations to favor the dynamic economic development of the Watershed. But, the PMCC's findings underscore that the fragile Watershed has little capacity to adjust quickly to sudden changes, natural or man-made. Further, the troubling evidence of rapid environmental deterioration at certain points of the Watershed is almost entirely due to slack environmental controls of industrial and residential waste water disposal. These signals should not be ignored.

Today, the need for such prudence, foresight and courage is greater. With the transfer of the Canal to Panama, vast areas of the Watershed, which for decades had been precluded from commercial exploitation, are now open to development. For the protection of the Canal Watershed, appropriate policies, effective controls, surveillance and enforcement are needed to channel economic forces towards sustainable development.

Good watershed management can reconcile the relentless pressures for economic growth with the urgency to preserve the vitality of the ecological systems supporting the Watershed. Of most concern will be areas not under official protection, precisely where rapid and unrestrained industrial and commercial development is taking place. Confronted with this challenge, effective PCW management will need to be:

- integrated, with the highest level of collaboration among all parties, private and public, involved in the Watershed;

- efficient, scarce economic and human resources dictate that duplication of efforts must be eliminated and complementarities sought from every perspective, and

- enforceable, effective, proportionate and swift enforcement measures will result in compliance of environmental regulations.

Current Watershed Management

An integrated management system of the Panama Canal Watershed does not exist. Diverse public and private institutions, each operating independently, carry out "environmental" activities in the Watershed, but often with little or no regard to the status of the Watershed as an integrated hydrological unit.

In Panama, natural resource management falls primarily within the domain of the central government. Since 1986, responsibility for the protection and conservation of natural resources has been concentrated in the National Environmental Authority (ANAM) and its predecessor institution, INRENARE. ANAM's operational regulations (Law 41, 1998) lay out the national principles and norms for the protection, conservation and recovery of the natural resources, both renewable and non-renewable, and the promotion of sustainable development. ANAM has the national authority to prescribe the guidelines and terms of reference for the submission of environmental impact studies. National parks and protected areas as well as most environmental sampling fall under the authority of ANAM. Almost all of the Watershed's forests are under the ANAM's protection.

Chapter 6 of Law 41 deals specifically with ANAM's authorities over water resources. Any activity that could affect the flow, nature or quality of water of a water body requires previous authorization from ANAM. All water users must comply with the ANAM Environmental Management Plan. ANAM is mandated to create special water management programs. However, Article 85 is explicit in identifying the ACP as the entity that shall administer, maintain and protect the water resources of the PCW, in coordination with ANAM, and in accordance with existing strategies, policies and programs related to the sustainable management of the natural resources of the PCW.

Within the central government, other institutions have environmental mandates, including:

- Ministry of Health, which sets environmental standards to ensure the health and well-being of the population;

- Ministry of Agricultural Development (MIDA), responsible for maintaining adequate conditions for agricultural, livestock and agro-forestry activities;

- Ministry of Commerce and Industry, responsible for mining, industry and tourism;

- Instituto de Acueductos y Alcantarillados Nacionales, (IDAAN), whose mandate is to ensure delivery of adequate supplies of potable water and waste water treatment;

- Inter-oceanic Regional Authority (ARI), responsible for establishing and implementing the regional land use plan for most of the Watershed; and

- Ministry of Housing (MIVI), which issues permits and zoning regulations related to residential development.

In addition, a number of Non-Governmental Organizations (NGOs), notably the Smithsonian Tropical Research Institute, ANCON, Fundación NATURA are engaged in natural resource management in the PCW. Their involvement ranges from biological research, to land use activities, to agro-forestry initiatives.

The Watershed encompasses the jurisdictions of several local governments. Included are two provinces, those of Panama and Colon; seven districts; and 36 *corregimientos.* Traditionally, these entities have played minor roles in natural resource management. With the introduction of direct mayoral election in 1994 and the appropriate levels of institutional support, user education and training, it is expected that local governments will begin to assume greater responsibilities in natural resource management.

In 1993, the Constitution established the *Autoridad del Canal de Panamá* (ACP) to succeed the Panama Canal Commission (PCC) with the transfer of the Panama Canal from the US government to the Panamanian government in 2000. The Constitution directed the ACP to assume the PCC's traditional responsibilities regarding the control, administration, and maintenance of the Canal.

In addition, the ACP was mandated to assume a new responsibility of the administration, use, maintenance and conservation of water resources of the Watershed, sweeping authorities, reaching far beyond those of its predecessor, the PCC. The ACP was to fill that significant institutional vacuum that had existed in the Watershed's management. It was legally authorized to become the key official

Panamanian agency to protect the water resources of the Watershed. As such, it was empowered to approve all proposed and existing projects or developments that could affect these resources.

Further, as guardian of the PCW's natural resources, the ACP is required to ensure coordination among the public and private entities involved in the Watershed. The ACP has been given a daunting challenge, as each entity operating in the Watershed has its own laws, regulations, and interests.

The National Constitution and Law 19 of 1997 convey to the ACP:

> the exclusive responsibility of the conservation, use and administration of the Watershed's ***water*** resource; as well as; responsibility, in coordination with the relevant governmental and non-governmental entities, for the conservation, use and administration of the Watershed's ***natural*** resources.

Inter-Institutional Commission for the Panama Canal Watershed (CICH)

For strictly Canal related functions, the ACP can look to the PCC's past performance as a point of reference. But, for watershed management, an entirely new frontier, the PCC can offer no such model. To implement its new mandate, the ACP will need to establish a new organization equipped with clear terms of reference, operational rules and regulations, as well as an organizational structure, personnel and funding sources.

Accordingly, Law 19 (Art. 6, June 11, 1997), created, within the ACP, the Inter-Institutional Commission for Panama Canal Watershed (*Comisión Inter-Institucional de la Cuenca Hidrográfica*, CICH). The CICH will facilitate the ACP in the discharge of its environmental responsibilities in the Watershed. The law is meager in details regarding the CICH, leaving the ACP with the responsibility to design a CICH which will best serve the needs of the Watershed.

Two years later, on July 17, 1999, the ACP Board of Directors met to begin to define better the CICH. "*Acuerdo 16*", which reflects the ACP's current policy regarding the CICH, represents operational regulations to the stipulations of Law 19 and therefore carries the full authority of the law.

Article 38 of the "*Acuerdo 16*" stipulates that the objective of the CICH is:

> "…to integrate efforts, initiatives, and resources for the conservation and management of the Panama Canal Watershed and to promote its sustainable use."

"Acuerdo 16" states that the ACP Administrator, or designee, will preside over the Commission. To keep the CICH manageable, the Board decided to limit membership to the following, in addition to the ACP, itself (Article 39):

- Ministry of Government and Justice;
- Ministry of Housing (MIVI);
- Ministry of Agricultural Development (MIDA);
- The National Environmental Authority (ANAM);
- The Inter-Oceanic Region Authority (ARI); and
- Two representatives of the NGO community, Fundación NATURA and Cáritas Arquidiocesana.

Article 40 specifies five functions for the CICH:

- To establish a coordinating mechanism among organizations active in the PCW.
- To establish, through the ACP, a financial and administrative system.
- To supervise programs, projects and policies needed for adequate management of the Watershed to minimize potential negative effects.
- To evaluate programs, projects, and policies in the planning phase to resolve possible problems or duplications.
- To establish an environmental information center for the PCW.

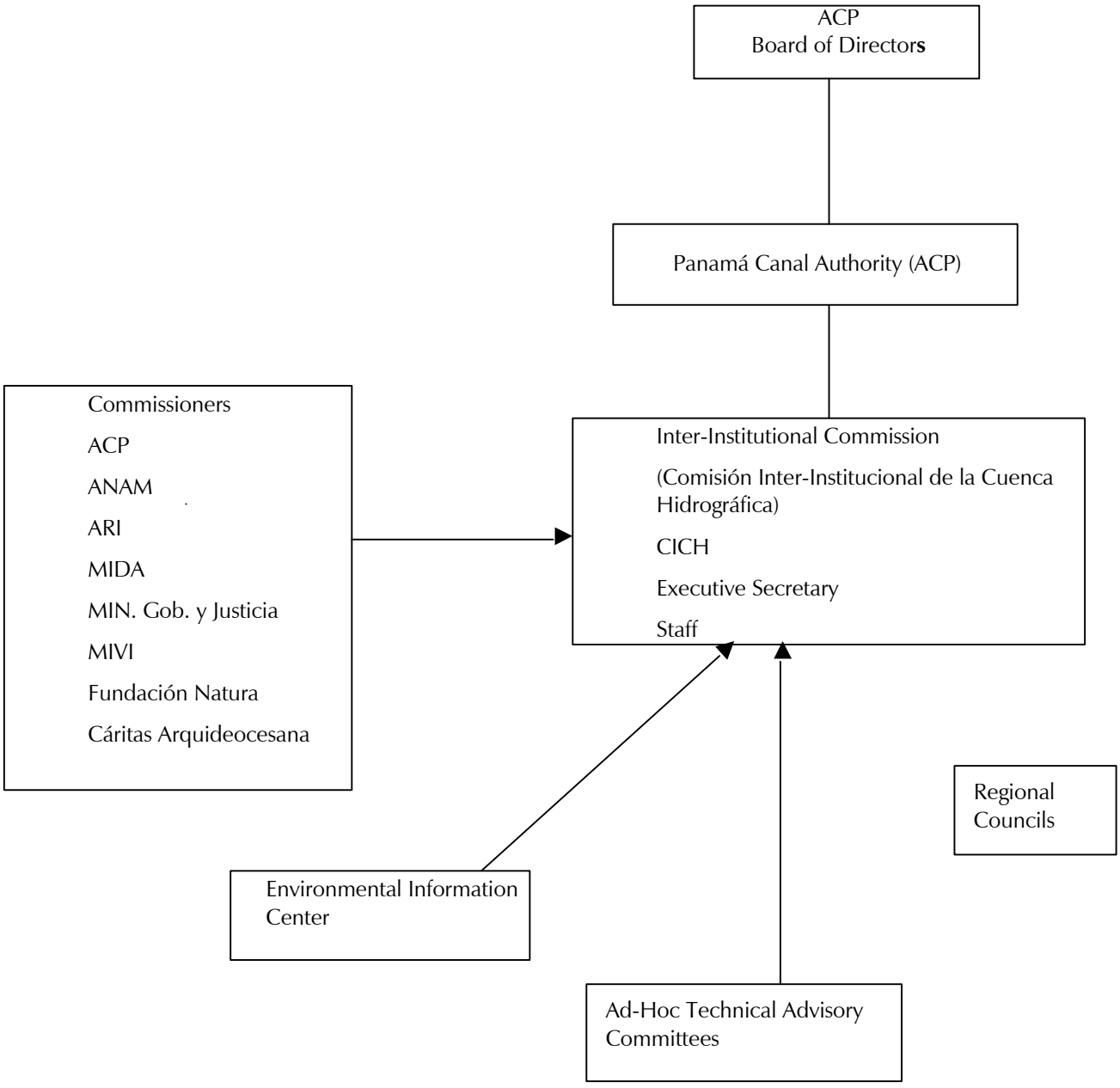
In addition, the cited document also states that: (a) the CICH has responsibility for coordinating and monitoring the projects that are implemented in the PCW, (b) the CICH can solicit and obtain, through the ACP, technical support and funding

from national or international organizations, and (c) ACP will provide the administrative support necessary for the CICH to comply with its functions. Article 45 provides that the CICH will adopt its operational and functional structure for the approval of the ACP Board of Directors.

With its eight Commissioners in attendance, the ACP formally inaugurated the CICH on March 15, 2000. Since then, monthly CICH meetings have been convened.

The ACP is currently in the process of contracting personal for the CICH Permanent Secretariat, including an Executive Secretary, a Secretary, an Administrative Assistant, a Data Manager, a Project Officer, and a Financial Officer (see Figure 1). The Secretariat will: *(1)* service CICH meetings; *(2)* establish effective coordinating mechanisms with the relevant entities; *(3)* consolidate necessary documentation, especially environmental impact evaluation, for review and approval by the Board of Directors; *(4)* facilitate the exchange of information among the various entities, especially with respect to the operation of the Environmental Information Center; *(5)* establish, maintain and update the Environmental Information Center; and, *(6)* prepare its budget for consideration of the CICH commissioners and approval of the ACP Board.

Figure 1 Organizational Structure



Over time the CICH could evolve to play a broader role in Panama Canal Watershed management activities. Additional functions would include a "Special Projects" initiative to conduct policy analysis, interact with local communities on small-scale watershed management interventions and carry-out public education campaigns to protect the PCW.

Outstanding Issue: Respected Institutional Stature of the CICH

Sound watershed management requires that the CICH be a strong and effective focal point to direct and guide the various parties active in the Watershed. The CICH will need to develop its institutional standing based on the following three elements:

1. Capacity to exercise its legitimate authorities;

2. Independence; and

3. Stakeholder access and participation.

Legitimate Authorities: How will the CICH, as a new entity, best introduce itself into the myriad of autonomous agents currently operating in the Watershed and obtain their collaboration? Which mechanisms can effectively define these new inter-institutional relationships?

To define the new inter-institutional relationships, several legal or quasi-legal instrumentalities are available to the CICH: (1) an Integrated Watershed Management Law; (2) a series of inter-institutional agreements with each and every institution with which the CICH will need to deal on a regular basis to carry out its functions; (3) an umbrella-style agreement among all institutions represented on the CICH; and (4) drafting of the operational regulations to Law 19 for the CICH through a consensual process involving the major institutions in the Watershed. Each of these instruments would need to be discussed with the relevant parties, negotiated and drafted and, in the case of the legislation, ratified by Congress.

Regardless of the instrumentality selected to define the mutual institutional obligations, in the drafting of the instrument it will be important to bear in mind that institutions will need an incentive to work with the CICH. CICH members and non-members alike will cooperate with, and participate constructively in the CICH only when it is clear to each that there is a direct benefit to them to do so (or a direct cost in failing to do so). If working with the CICH does not provide an identifiable value added, other agencies, having no incentive to be committed to the CICH, will regard the CICH as merely another layer of bureaucracy, competing for scarce resources.

Independence: Vital to the CICH's creditability will be the degree to which the institution is perceived capable of making sound and unbiased decisions regarding the Watershed's welfare. The CICH will need to be viewed as an entity that enjoys a certain amount of independence from the ACP. If, to cover all its costs, the CICH must submit annually budgetary requests to the ACP, the CICH will act (be viewed as such) as another division within the ACP. If, however, the CICH can obtain some fiscal autonomy, supported by the yields of its own endowment or other revenue streams, the CICH will have a greater latitude to act in the objective interest of furthering coordination and sound natural resource management of the Watershed.

Stakeholder access and participation: Comprehensive representation of stakeholders on the CICH is closely related to its standing and organizational effectiveness. How well the CICH is able to embody all the important actors in the Watershed will be a measure of how seriously the institution will be regarded within the institutional framework in Panama. Confidence in the CICH as an effective and constructive entity will be largely a function of the extent to which the CICH is perceived as a forum to which all parties interested in the Watershed enjoy some degree of access.

The CICH will play an unique and indispensable role in the protection of the water resources of the Watershed by establishing itself as the forum in which all stakeholders, all entities interested or involved in the protection of the Watershed, can, to some degree, participate. Should the CICH be perceived as a forum for government officials, more intent upon preserving their respective institutional turfs than protecting the Watershed, expectations for the CICH as the legitimate national advocate for Watershed management will disappear. Its regulations and by-laws should ensure that CICH is flexible enough to be able to eventually

include additional members, as well as broaden its sessions to allow the participation of other parties.

Recommended Agenda for Action

The ACP has taken the preliminary steps towards establishing the CICH. For this entity to mature into an important agent in the protection and conservation of the water resources of the PCW, in its first years, the CICH should:

1. **Contract staff**, beginning with the Executive Secretary, Administrative Assistant, Data manager; Project officer; and Financial officer;

2. **Begin the consensual process of defining the CICH's institutional functions and relations with other entities**. To enhance the standing of the CICH, participation in this dialogue should be as broad as possible, including players from the public and private sectors, as well as representatives of local communities;

3. **Formalize relations with key entities**, especially, ANAM and ARI. This will require an analysis of the procedures and processes of the respective institutions to see how best the objectives of the CICH can be served;

4. **Identify and develop sustainable funding sources**. This will require (a) a serious review of funding alternatives; (b) a determination of the desirability of establishing its own "personería juridica"; (c) an evaluation of the financial conditions; and (d) the preparation of the necessary documentation; and

5. **Establish the Environmental Information Center,** one of CICH's chief responsibilities will be to monitor the state of the Watershed. To this end, the CICH must establish an Environmental Information Center to collect, store and update an environmental database. The initial

objective of the Center should be to become the single, most complete depository for data concerning every aspect related to the Watershed's environmental status.

Summary Report

1. Vision of CICH and its Short and Longer Term Strategies

The Vision of the CICH

The Panama Canal transfer presents the Government of Panama new opportunities and difficult challenges. The Panamanian public legitimately expects that the transfer of valuable Canal real estate and infrastructure, as well as the Canal operations, will generate concrete national economic and social development.

According to the 1977 Treaties, the people of Panama own the Canal. They are represented by a Panamanian Board of Directors of the *Autoridad de Canal de Panamá* (ACP), which sets broad policy guidelines as well as holds the power of the purse. The Administrator of the ACP attends to the day-to-day operations of the Canal.

Because the Canal cannot operate without abundant water from the Panama Canal Watershed, the ACP has been given unique prerogatives over decisions on the use of the Watershed and its water resources. Nevertheless, watershed management is a responsibility shared among many public and private entities. Therefore, the enabling legislation for the Canal (Law 19) calls for the Canal Authority to create and convene a Coordinating Committee (CICH[3]), under the chairmanship of the Canal Administrator, of interested parties to address watershed management decisions. The CICH's specific role, modalities and operational procedures are currently being developed and formulated. CICH can become a useful interface between the private operations of the Canal Authority and key public and private entities of Panamanian society.

[3] CICH is the Comisión Inter-Institucional de la Cuenca Hidrográfica or the Inter-Institutional Commission for the Hydrographic Watershed.

Best Practices and Lessons Learned in Watershed Management

Experiences in watershed management worldwide reveal that, regardless of their institutional configuration, successful experiences share certain common characteristics. Two major types of organizational structures have evolved over the years: (1) authorities, with direct operational responsibilities; and (2) commissions, which tend to serve as coordinating mechanisms. Commissions may be more applicable to the CICH's mandate.

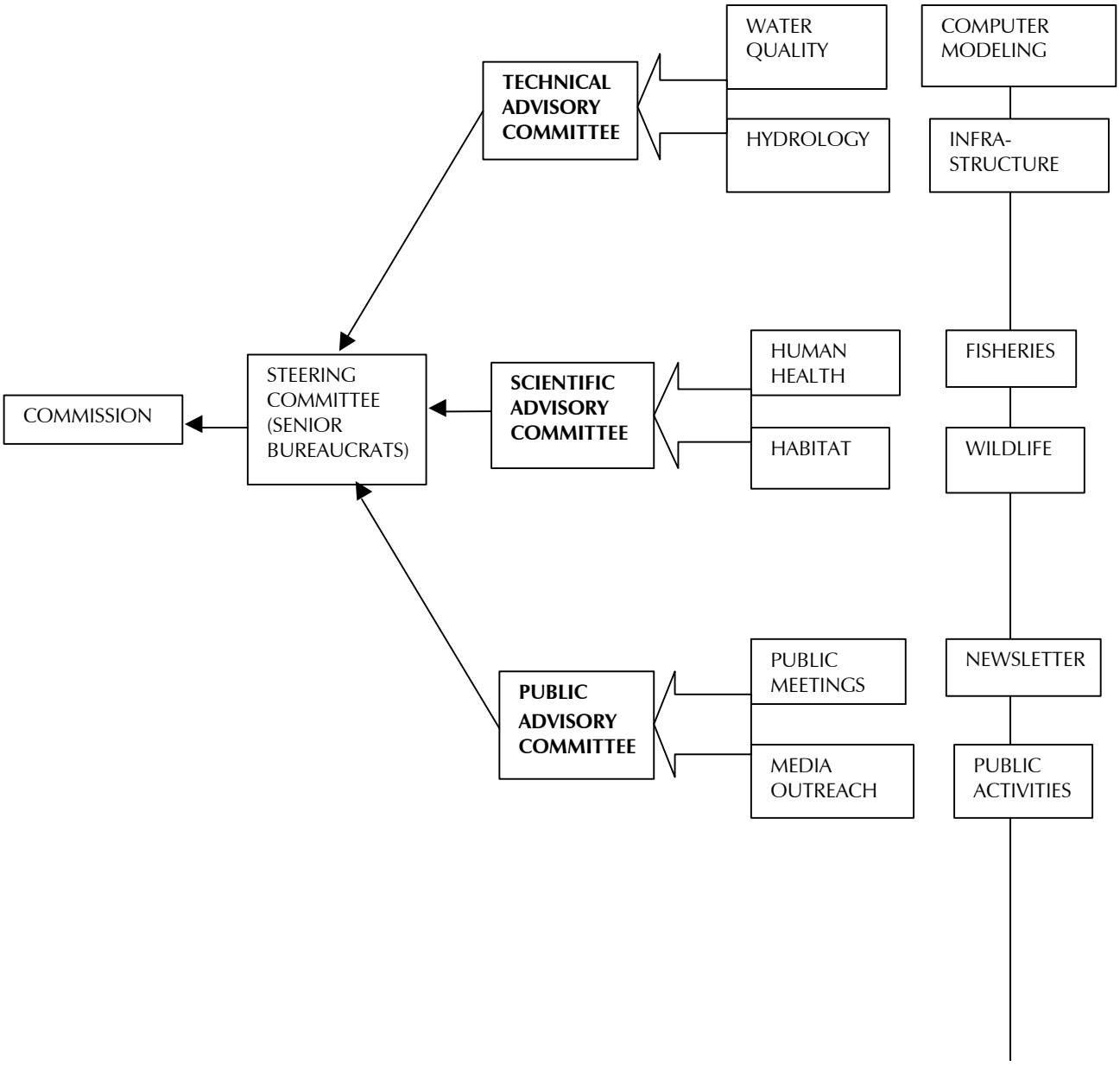
Commissions tend to be composed of representatives from multiple institutions, often including a variety of executive branch agencies and smaller political units. They tend to serve more as a consensus–builder which facilitates financing and implementation of programs by constituent entities or third parties. These organizations are keenly focused on water resources management. Inter-institutional arrangements such as the Interstate River Basin Commissions and the Chesapeake Bay Commission in the U.S. and the Lerma-Chapala Basin Council in Mexico undertake studies, monitoring and information dissemination. They may also exercise regulatory functions or coordinate the efforts of their constituent member organizations. Their membership includes national governmental entities, as well as representatives of local government and other stakeholders, such as the private sector and local communities in decision-making, either directly or through an advisory capacity.

An example of an organizational structure used for inter-institutional commissions is shown in Figure 1[4]. It illustrates the participation of the scientific, technical and public stakeholder communities in the watershed planning process. Modern watershed management has broadened from a strictly engineering/economic focus to one which also factors in scientific (e.g. environmental concerns) and sociological factors. This management approach effectively uses an open consultative process that can inform and influence decisions taken by the inter-institutional commission.

4 Other examples of organizational structures for inter-institutional watershed management entities are presented in Appendix 8

Figure 1

An Example of an Advisory Committee Structure for Inter-Institutional Watershed/River Basin Management Commissions[5]



[5] From Isabel Heathcote, "Integrated Watershed Management: Principles and Practice", 1998, p 129

Principal ACP Watershed Mandates and the Role of the CICH

The CICH is intended to assist the ACP carry out its responsibilities over the administration, maintenance and use and conservation of the water resources of the Watershed. In this area, Law 19 assigns to the ACP the following three principal functions:

1. To administer, conserve and maintain the water resources for the operation of the canal, the supply of potable water and generation of hydro-electric power for the neighboring populations, and to promote the rational and sustainable use of the water resources;
2. To coordinate the conservation of the natural resources of the Watershed with the relevant public and private entities; and,
3. To approve the strategies, policies, programs and projects, public and private which could affect the Watershed.

It is to these ends that the CICH is to coordinate, with governmental entities and NGOs, specialized in the subject, with responsibilities and interests in the natural resources in the PCW. Table A outlines each of these three ACP mandates, identifying the associated CICH functions, activities and legislative, administrative or regulatory requirements.

Table 1 Principal ACP Watershed Mandates and the Role of the CICH

ACP Mandate	CICH Function	CICH Activity	Regulatory or Institutional Arrangements Requirements
Administer, conserve and maintain the water resources	CICH to monitor developments in the PCW and conduct in-depth investigations as warranted	Establish Environmental Information Center Maintain a comprehensive data base Receive, collect, store, update and analyze data Develop collaborative inter-institutional information sharing network Special Studies and ad-hoc technical committees	IA or other agreements specifying data requirements and ensuring timely and compatible transference of data transfer to the CICH Environmental Information Center.
Coordinate	CICH to convene regular meetings CICH as forum for local communities CICH conduct open meetings	ACP to decide acceptable forums for CICH meetings Field contact in the communities Use of public media to communicate	Draft CICH By-Laws to allow the greatest degree of flexibility so that Commissioners may have the prerogative to allow for open forums and participation of non-members and the possibility of the inclusion of additional members to the CICH, especially from the private sector and local government.
Approve	Receive and evaluate for approval proposed private or public-sector strategies, policies, programs and projects affecting the Watershed	All private and public investments, projects, programs and plans which would take place in the PCW or could affect the water resources of the PCW; and, have been provisionally approved by ANAM or any other entity, would be presented to the CICH for its review, and for final approval of the Board of Directors of the ACP. CICH would convey the ACP decision to the relevant authorities.	An arrangement, an IA, operational regulations or legislation would require relevant entities, ANAM, in particular, to ensure that project proposals would be submitted to the CICH in a timely fashion.

Selection Criteria for CICH Mission Statement

Selection Criteria

To accomplish its complex and demanding mandate, CICH needs a well-articulated Mission Statement conforming to the following criteria:

1. Consistency with the CICH's mandate; Does the statement ensure the efficient operation of the Canal by coordinating, with governmental and non-governmental organizations specialized in the subject, with responsibilities and interests in the natural resources in the PCW, in the administration, conservation and use of the natural resources of the Watershed?
2. Conformity with the National Constitutional and legal framework; Is the statement consistent with the National Constitution and other national laws, especially those related to prerogatives and responsibilities of the residents of the Watershed, and other national and local entities which are involved in natural resources protection, water resource utilization, land use, health and sanitation and maritime affairs? and;
3. Consistency with international treaties and obligations; Is the statement consistent with international obligations of the GOP, especially with respect to the management of natural resources and navigation?

Consistent with *Acuerdo* 16, the CICH is:

- an organization which, assigned to the ACP, is subject to its coordination and under its direction;
- presided over by the Administrator of the ACP;
- composed of eight members, six of which are ministerial ranking directors of public entities and two members are NGO representatives.

Proposed CICH Mission Statement

The following is offered as an initial draft of a *"Mission Statement"* for the CICH. Further discussions, within the CICH and with other stakeholders, will be conducted to finalize this statement, which will determine the CICH's short and longer-term strategies and course of action, as well as more pragmatic considerations, such as personnel, infrastructure and funding requirements.

> "The Mission of the CICH is to serve as the ultimate protector of the Watershed of the Panama Canal for the benefit of all Panamanians. The Watershed of the Panama Canal can serve as a vehicle for the social and economic benefit of Panama and Panamanians, through the application of proper policies for the management of the Watershed. The CICH will accomplish its Mission through the collaborative efforts of governmental, non-governmental, community based, private sector, and other interested participants in the Watershed. The CICH will administer, maintain, use, protect, develop, and manage the natural resources of the Watershed, and promote its sustainable development, to assure the effective operation of the Panama Canal, the efficient supply of potable water for neighboring metropolitan areas, the generation of hydroelectric energy, and the maintenance of bio-diversity for future generations."

The operational significance of key phrases of this statement need special consideration by the CICH as well as others interested in the Watershed, including:

- Ultimate protector: Careful deliberation should be given to the meaning of the "ultimate protector". Would the CICH be the ultimate protector in its capacity as the:

    1. Institutional coordinator;
    2. Facilitator;
    3. Advocate; or
    4. Project investor?

    Table 2 analyzes four possible interpretations of the CICH's mission and the associated implications.

- Through collaborative efforts of governmental, community-based, private sector and other interested parties in the Watershed

    Experiences throughout the world of successful as well as failed watershed management initiatives have demonstrated the critical need to have the support and the cooperation of all the Watershed's stakeholders.

- To promote its sustainable development, to assure the effective operation of the Panama Canal, the efficient supply of potable water for neighboring metropolitan

areas, the generation of hydroelectric energy, and the maintenance of bio-diversity for future generations.

How broadly defined would its mandate be? Would the active involvement of the CICH be limited to the water resources or does it by implication go beyond to include socio-economic issues and programs in the Watershed.

Table 2 Vision Options and Implications

Type	Characteristics	Objective	Advantages	Disadvantages
Coordinator	a. Periodic high level CICH meeting	a. Discuss issues and problems as related to the operation of the Canal	• Easily managed • Low funding needs	• Lacks stakeholder participation and support • Likely to fail
Facilitator	a. same b. Open forum for interested parties c. Conduct analytical studies	a. same b. Promote stakeholder participation c. Generate stakeholder support d. Provide forum for discussion of issues of critical importance to watershed management	• Greater public participation and support • Greater probability of success	• Greater funding needs • Outreach operations and public relations activities required • More sophisticated management
Advocate of Watershed Management	a. same b. same c. same d. Begin basis for public discussion related to Integrated Watershed Management	a. same b. same c. same d. same Become focal point for the formulation of the Plan	• Strengthened watershed management	• Goes beyond the letter of law, could encounter resistance, both public and private
Pro-Active CICH	a. same b. same c. same d. same e. Fund and contract for activities in the Watershed	a. same b. same c. same d. same e. same f. Direct formulation of projects to be implemented in the Watershed g. Seek and manage funding for projects	• Have direct control over concrete programs for protecting and conserving the water resources	• Could conflict with or displace programs of other institutions in the Watershed • Significantly greater funding needs • Highly complex administration

Taken within the context of the objective/vision of the CICH, "to integrate efforts, initiatives, and resources for the conservation and management of the PCW, and to promote its sustainable use," the above functions suggest an operational framework characterized by two possible operating scenarios that would define the Strategic Goals of the CICH.

a. Base Scenario or Scenario I. This scenario would be comprised of a series of basic activities using a rather narrow definition of potential CICH roles in coordinating and supervising PCW management. These include: (1) performing a coordinating function among entities involved in the PCW; (2) establishing with the ACP a financial and administrative system for CICH operations; (3) supervising programs, projects, and policies needed for adequate management of the PCW; (4) evaluating programs, projects, and policies with PCW impacts in the planning phase; and (5) establishing an Environmental Information Center for the PCW.

In essence, this scenario casts the Commission's primary, and almost exclusive role, as one of coordination and supervision. Under this scenario, the Commission is an important forum for deliberation and "consensus-building" among entities engaged in Canal Watershed use and management matters. It would also serve as a "clearing house" for data, including information on sources of funding, on Canal Watershed Management. Implementation of PCW rehabilitation and enhancement activities would be carried out by technical line entities, many of whom would be CICH members, such as public sector ministries, Not-for Profit (NGO) organizations, and commercial firms.

b. Enhanced Scenario or Scenario II. Alternatively, or as a result of institutional evolution over a period of years from the Base Scenario, the Enhanced Scenario would be comprised of the activities of the Base Scenario, as well as a series of more pro-active functions. The CICH would move from a strictly operational role into a more programmatic one.

Suggested additional CICH activities under this scenario would include: (1) managing a Special Projects Program to provide such innovations as eco-tourism investment studies, water quality or waste management project studies, parks and protected areas project identification, etcetera; (2) watershed management policy formulation (e.g. water usage, recreational uses, land use conversion, waste disposal); (3) involvement in obtaining development finance resources from the private sector, government, or multi-lateral donor or banking institutions into special projects for the PCW; and (4) pursuit and administration of adequate norms for maintaining the performance of the PCW.

These kinds of activities can become complex, and can require considerable staffing resources. For example, a program to generate, fund, and administer or oversee special projects will find the "arena" a competitive one, in terms of attracting donors, banks, or investors. It is recommended that the entry of CICH

into such a program should not be initiated until the CICH has become fully operational.

Issues of Short-term and Longer-term Concern to the Watershed and Possible Strategies of the CICH

There are two major issues that will impinge on decisions about the organization of the CICH. These are:

Annexation of the Watershed

The 1999 law that enlarged the Watershed by 225,000 ha, much of which is privately owned property, has several major implications for the CICH. Not only is there much less information available for management decision-making but the public perception of this law is poor. Much of the public considers that it was neither consulted nor informed of the change. As a result, public confusion and anxiety surround the decision.

To establish itself as the primary institutional guardian of the Watershed, the CICH could provide a focal point for an important and much needed outreach program to educate the media, public officials and local residents of the justification for annexation as well as its environmental, economic and social implications. CICH could conduct special workshops and seminars on the issues targeted to the media, public officials, the Church and NGOs.

For the ACP, this would serve as a good occasion to develop a real and concrete presence in the Watershed and to integrate itself with the complex interface of environmental, social and economic factors which play a critical role in the CICH's mandate in the PCW management.

Opportunity to Revisit the Regional Plan and an Integrated Watershed Management Plan

The original land use plan developed for the Watershed, the Regional Plan contained in Las 21 needs to be reconsidered. With the expansion of the Watershed that occurred in 1999, coverage of the original plans encompass only 60 percent of the total Watershed. The need to update the land use plans offers the Panamanian government and society an opening to re-examine the desirability of such a plan.

When the original land use plan was conceived, the public had limited opportunity to express their opinion concerning land use planning and the associated application of central government dictates to determine the use of privately-held property. A national discussion can now take place to review the concepts of the Regional Plan.

Panama will need to decide if it is in its best interest to use land use measures to allocate economic resources of the Watershed. The public should be made aware that such measures represent (1) an infringement upon the constitutionally-mandated rights of individuals to own and dispose of property; and (2) enormous costs in terms of serious resource allocations, inefficiencies, as well as burdensome administrative and enforcement expenditures.

The public should assess the relative merits of other watershed management options. As an alternative measure, an Integrated Watershed Management Plan (IWMP) approach, should be evaluated. The IWMP would protect the Watershed, not with land use ordinances, but by serving as a reference point for any investment decisions in the Watershed. The Plan would be based on criteria for sustainable environmental, economic and social development.

Should the public dialogue determine that there is consolidated support for this approach, the CICH could place the deliberations, among all interested parties, to prepare the Terms of Reference for an Integrated Watershed Management Plan, on its agenda, becoming one of the CICH's most significant interim-term (5 –7 years) goals.

The CICH, a response, in part, to the fragmented institutional authorities in the Watershed's management, is well-positioned to lead the national dialogue concerning Integrated Watershed Management. Because watershed management

involves both land and water, and addresses urban and rural issues, many Panamanian agencies, some of which are CICH members, will have partial responsibility for the formulation and implementation of such a plan. The challenge of the CICH will be to transcend the partial and, sometimes, duplicative efforts of these agencies to develop a Plan which will protect and conserve the resources of the Watershed, while promoting sustainable economic and social development.

2. Alternative Coordinating and Conflict Resolution Mechanisms

The earliest test confronting the CICH will be to deftly position itself as the official coordinating focal point for the various entities operating in the Watershed. The CICH will need to do this in a manner that ensures the cooperation and collaboration of these entities. To formalize these relationships, three legal and quasi-legal coordinating instrumentalities are available to the CICH. They are: (1) an integrated watershed management legislation; (2) a series of Inter-institutional Agreements (IAs) with each and every institution with which the CICH will need to deal on a regular basis to carry out its functions; and (3) drafting of the operational regulations to Law 19 through a consensus of the major institutions involved.

1. An umbrella piece of legislation, embodying all entities involved in the Watershed, could be used to formally define these institutional relationships. This instrument would have the obvious advantage of then carrying the force of law in questions of compliance and enforcement. However, the legal instrument would limit flexibility in these relationships, restricting the actors' ability to respond effectively to changing circumstances. In addition, the ratification process for such a complex piece of legislation would be costly and time consuming. It could easily require more than three years before a law could be approved and agreement could be reached on regulations.
2. A written Inter-institutional Agreement (IA) between the parties could also define the institutional relationship. Drafting such understandings is common and relatively uncomplicated. Frequently, having such written understandings in place prevents institutional tensions from developing. Should disagreements arise, the understandings can usually facilitate a rapid resolution, although they do not carry the weight of law. However, continuity can be problematic with IAs as they are frequently dated, requiring that they be periodically redrafted.

Nevertheless, instruments, such as the Inter-institutional Agreement and the agreement of technical cooperation, are respected and used frequently by the public entities of the Panamanian Government. An IA is a practice used to establish institutional relationships, while avoiding the burdensome legislative alternative.

In addition, an evaluation of the efficacy of "bilateral" IAs versus "multilateral" IAs should be undertaken. That is, this project should assess whether the CICH would be more effective in fulfilling its obligations with individual IAs executed between ACP and each CICH member, or with a single IA executed by all of the members of the CICH.

In summary, IAs should be evaluated in light of the following points:

- as an element of the policy dialogue among the CICH members
- to address conflicts of law such as gaps or overlapping jurisdiction
- as an effective means to identify and commit to required action among the responsible agencies
- as an alternative to amending existing law or passing new regulations
- as a means to establish a formal or informal system of dispute resolution
- evaluate the efficacy of "bilateral" versus "multilateral" IAs

3. The third option, drafting of the operational regulations to Law 19, is perhaps the most attractive. As prescribed by the Law, the ACP is directed to write the operation regulations to any and all aspects of Law 19. Such regulations would require only the approval of the ACP Board of Directors. As these would be regulations to an existing law, and the law, itself, empowered the ACP to prepare the regulations, such regulations would have the advantage of carrying the weight of law, thereby facilitating compliance and enforcement.

To solicit solid cooperation and collaboration among the major players in the Watershed, the CICH, once having prepared the draft operational regulations, should make these available to the interested parties for their response, feedback and commentaries. To the extent possible, the regulations need to be developed through a consensual process.

Recommended Action: It is recommended that the CICH develop an omnibus IA that includes all of the Commission members. In this agreement special attention must be given to the role and relationships regarding the ACP, ANAM and ARI. Subsequently, but as one of its most important priorities, CICH would, in collaboration with its members as well as other entities, public and private,

prepare the operational regulations corresponding to its mandate as laid out in Law 19. Any existing IAs would then be subsumed into these regulations.

Coordination and Conflict Resolution Tools

Conflicts between institutions, private and public, will inevitably arise in areas as delicate as the appropriate utilization, use and conservation of water resources in the Watershed.

A number of inter-institutional watershed management entities in a variety of different cultural contexts have found that a consensus-based approach to decision-making combined with ample access to the decision-makers by key stakeholder can effectively eliminate or, at least, reduce conflicts.

On those occasions where conflicts cannot be resolved through open dialogue and consensus building, the CICH will need to be able to recommend to the Board of Directors actions to be taken. Should a discrepancy involve public entities of equivalent stature, the CICH could recommend that the dispute be presented before the *Procuraduría de la Administración* for resolution. Should the parties wish to appeal the decision, the issue could be taken before the *Tercera Sala* of the Supreme Court for final resolution.

In Panama, alternative dispute resolution techniques are gaining greater acceptance in the private sector. However, in disputes between two public institutions, national law precludes this option in disputes between public institutions. Public institutions may only resort to such methods in legal disputes concerning certain relationships with private sector parties.

Recommended Action: As the established tools for reconciliation of disputes between public entities is limited, it is recommended that the Inter-institutional Agreement(s) would provide for consensus-based decision–making and mutually agreeable resolution methods. These methods could be applied prior to resorting to more formal, lengthy processes available.

3. ACP-ANAM Institutional Relationship

A closely coordinated relationship between ACP and ANAM is critical to sustainable watershed management. ANAM's enabling legislation, Law 41, fully acknowledges the ACP's precedence over the water resources of the PCW in Article 84 which states:

> "*The administration, use, maintenance and conservation of the water resources of the Panama Canal Watershed are to be carried out by the Autoridad del Canal de Panamá, in coordination with ANAM in conformity with the strategies, policies and programs related to the sustainable management of the natural resources of the Watershed."*

The relationship between the ACP and ANAM should be one in which the respective institutional areas of competence complement each other. The ACP's competence lies in its particular focus on the specific geographic region of the PCW and the ramification of the Watershed's conditions to the supply of water for the Canal and potable purposes. Of particular relevance to the ACP is ANAM's institutional *forte* regarding: (1) the environmental impact evaluation process; (2) the establishment of environmental norms and standards; and (3) the extraction of environmental samples.

Environmental Impact Evaluation Process: According to Law 41 of 1998, ANAM is the national entity with competence over the process and the approval of environmental impact evaluations. The operational regulations for the Environmental Impact Evaluation Process (EIE) (Executive Decree No 59, March 16, 2000) detail the criteria and procedures for such evaluations. Proposed activities found listed in Article 14 of the Decree 59[6] are subject to the EIE

6 The activities are divided into eleven categories, including (in parenthesis are the OSs which have responsibility for at least one activity in the category):

1. mining (MICI);
2. exploration of hydrocarbons (MICI);
3. forestry (ANAM, MICI);
4. agro-industry (MIDA, MICI, ANAM);
5. fisheries (AMP, MIDA);
6. energy and industry (Ente Regulador de los Servicios Públicos (ERSP), MICI, MINSA, MIDA);
7. transportation (MOP, FIS, ANAM, AMP);
8. waste disposal (MINSA, IDAAN);
9. tourism and residential and commercial infrastructure (MIVI, IPAT, ERSP);
10. other infrastructure (MICI, MIDA, AMP/MEF, MIDA, IDAAN/MINSA, ERSP); and
11. **DEVELOPMENT PLANS (MIVI, ANAM, MIDA, IPAT, AMP, MICI, ERSP).**

process. Article 14 also identifies, for every activity listed, a corresponding sectoral entity with a specific sector competence, such as MIVI for housing projects, or MICI for industrial projects and MINSA or IDAAN for water quality or waste disposal projects. Promoters of proposed activities must submit the EIE study to the environmental unit of the designated sectoral entity, corresponding to each proposed activity. Based on its review, the sectoral entity prepares a report for submission to the ANAM Regional Office.

Category I projects, those proposed activities which are expected to have no significant negative environmental impact, as well as Category II projects, those whose potential negative environmental impacts can be contained or mitigated with the application of normal preventive measures, may be reviewed and approved at the Regional ANAM level. All Category III projects, proposed activities whose potential negative environmental impacts pose a serious threat to the environment, require the review and final approval of the National Office. Once a proposal has completed the process and has been approved by ANAM, an Environmental Resolution is issued to the Promoter allowing the activity to proceed.

Activities relevant to the protection of the Watershed, and hence of interest to the ACP, cut across many sector categories. Almost every category contains activities that could, if built in the Watershed, have an effect on the water resources of the Watershed. Of particular interest are the categories related to waste disposal, many of which fall under the jurisdiction of the MINSA. These include:

1. The construction and operation of systems for the management, treatment and final disposal of solid and industrial, residential and toxic wastes;
2. installation of treatment facilities for final disposal of toxic or dangerous wastes;
3. land fills; and
4. installation of treatment facilities for communities' solid and liquid wastes.

Also of importance to the protection of the Watershed, are those projects in the Watershed related to the supply of potable water, falling under the competency of IDAAN. These include the potable water and sewerage systems, and treatment plants, plants to treat sludge, cleaning systems for septic tanks and lagoons.

Other projects which can affect the Watershed are those related to residential development, including large-scale housing projects, which are reviewed by MIVI, and those related to tourism, covered by IPAT.

The affairs of the PCW cut across ANAM's sectoral lines as well as its geographic and geo-political division. As a geographic area, the PCW cuts across the jurisdiction of seven districts, or what would eventually correspond to seven ANAM regional offices.

An agreement between ANAM and ACP/CICH on roles and responsibilities would need to ensure that: (1) the ACP is able to exercise its mandate to protect the water resources of the Watershed; (2) ANAM fulfills its legal obligation to lend its fullest support to cooperate with the ACP in carrying out its responsibilities; and (3) institutional efforts are complementary and duplication of efforts are avoided.

An arrangement which could achieve these objectives would be for ANAM to submit to the ACP, via the CICH, just prior to the issuance of the Environmental Resolution, all project proposals of Categories II and III which are to take place within the confines of the Panama Canal Watershed. Once these proposals are reviewed and receive ACP final approval, ANAM would issue the Environmental Resolution. This arrangement could be formalized either in a memorandum of understanding between the institutions, or included in the operational regulations for the Law 19 or embodied in a future integrated watershed management legislation. For expediency, it might be useful to first agree to such an arrangement through a bi-lateral IA between the ACP and ANAM.

Establishment of Environmental Norms and Maximum Permissible Limits: ANAM has the national authority to establish environmental standards and permissible maximum limits of substances. In the case of standards relevant to the water resources of the Watershed, especially those related to permissible water flows or contamination, the ACP should play a role in their formulation.

Executive Decree No 58 of March 16, 2000 describes the processes for the establishment of these standards. Every three years, the ANAM General Administrator prepares and presents to the National Environmental Council a program of the standards to be reviewed or set during the course of the next three years. Once approved by the Council, ANAM proceeds to implement the program by establishing the various standards to be reviewed by the Technical

Committees. These Committees are generally learned bodies, composed of scientists, academics, and environmentalists. The Committee produces a document, containing its recommendations and the supporting scientific studies. ANAM reviews the report and conducts cost-benefit analysis regarding the impact of the implementation of such standards to the local population, economy and eco-systems. Summary reports are then published in newspapers and submitted to the Consultative Provincial Committees. ANAM receives and evaluates commentaries from the general public and the Committees. Finally, ANAM approves the norm and publishes a time schedule for its implementation.

For the purposes of the PCW management, the ACP would need to be able to review the three year program and should there be a standard of relevance to the management of the Watershed, request to be appointed to the corresponding Technical Committee.

Environmental Sampling: Regulation of environmental sampling falls under the authority of ANAM. In addition, extraction of such samples from the four National Parks and other protected areas of the Watershed, under ANAM jurisdiction, and as well in the Smithsonian Tropical Research Institute's scientific research center of Barro Colorado is prohibited. However, the ACP may be required to extract samples from the Watershed, within and outside of the protected areas and those of the international institutions to fulfill its mandate of monitoring the environmental conditions of the Watershed. Agreements will be needed to formalize and rationalize the extraction of such samples.

Recommended Action: Under an omnibus IA it should be clearly defined that:

1. ACP is sufficiently integrated into the ANAM Environmental Impact Evaluation Process so that the ACP can review and approve or reject any project proposed which could have significant negative effects on the water resources of the Watershed;
2. ACP may, if deemed appropriate in the fulfillment of its responsibilities over the natural resources of the Watershed, participate in the establishment of relevant norms and standards; and,
3. ACP may have access to environmental samples so that the ACP may fulfill its mandate to monitor the environmental situation of the Watershed.

4. ACP-ARI Institutional Relationship and the Need to Reassess the Land Use Plan

Because the respective mandates of the ACP and the Authority of the Inter-oceanic Region (ARI) are complementary and, in certain instances, overlapping, it is important to the Watershed management that the distinct institutional roles are well differentiated. Law 5 established ARI in 1995 and tasked it with the development of a Regional Plan to dispossess the physical assets of the Panama Canal, while providing that the Watershed is conserved and protected, specifically ensuring an adequate water supply for drinking water and Canal operations. Regarding issues related to the Canal and the ACP, ARI is mandated to consult with and take into consideration the concerns of the CICH members (Art. 5 (7)) and is prohibited from selling any land deemed necessary for the protection of the water supply (Art. 6).

Law 21, the Regional Plan for the Development of the Inter-Oceanic Region and the General Plan for the Use, Protection and Development of the Canal Zone of July 1997, gave legal effect to the two ARI plans. These Plans apply to the "traditional" Watershed, only about 60% of the area of the current total Watershed. The Plans do not cover the total Watershed, which, by virtue of Law 44 (August 1999), some 212,112 ha were annexed to the "traditional" Watershed, reaching a total of 552,761 ha.

Since 1997, with Law 21, these Plans carry legal authority. The General Plan is concentrated in the area corresponding to the old Canal Zone and the Regional Plan provides zoning guidance for the sustainable development of the natural resources of the traditional Watershed area. Table C presents the land use changes as expected with the application of the Regional Plan.

Table 3 Land Use Conversion Under the ARI Regional Plan

Use Category	From 1995		To 2020	
	Area (ha)	Percent of Total	Area (ha)	Percent of Total
Canal and Associated Lakes	48,500	12.0	56,000	15.0
Protected Areas	130,000	34.0	150,000	40.0
Sustainable Agriculture	1,000	0.5	30,000	8.0
Extensive Livestock	142,000	39.0	6,000	2.0
Forestry/Agro-forestry	1,000	0.5	88,000	23.0
Urbanization/ Infrastructure	22,500	6.0	45,000	12.0
US Military Use	30,000	8.0	0	0.0
Total	375,000[7]		375,000[8]	

To date, ARI has concentrated its activities on the implementation of the General Plan. Most of the Authority's activities have involved the selling to private concerns, individuals and commercial developers, infrastructure, buildings and real estate, transferred to the Panamanian government.

A major review of the Regional Plan is called for. First, there is the obvious need to update the Plan to incorporate the recently annexed areas to the Watershed. But, perhaps more importantly, the desirability of a Plan which replaces market for administrative mechanisms to determine resource use requires re-evaluation.

Two important aspects of the Regional Plan deserve serious reconsideration by the Panamanian people, government and those intimately interested in the well being of the Watershed. The first is the legal and constitutional consistency as well as the desirability of the approach of the Plan.

The Plan´s intentions are sound – the promotion of economic development in the Inter-Oceanic Region as well as the protection of the Watershed's natural resources. But the Plan's approach, to allocate privately held economic resources by government decree, needs reconsideration. Too often, such measures, which attempt to assign economic resources, especially private property, have proven to be costly and difficult to implement, ultimately tend to result in high economic

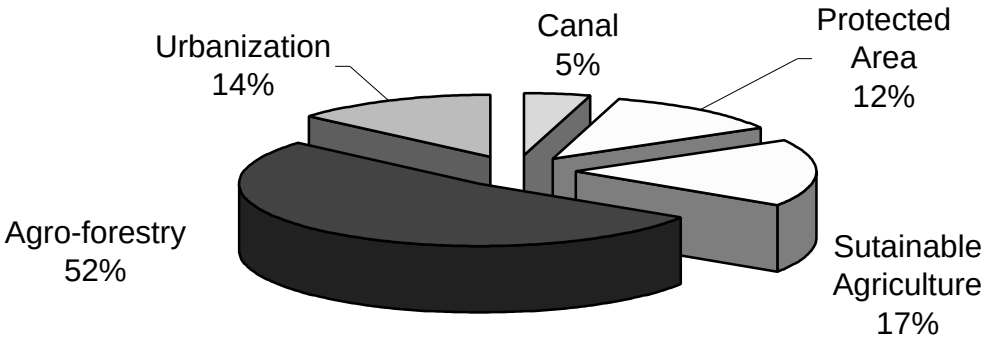
[7] See footnote below.

[8] This area is greater than that of the traditional Watershed, as the ARI Plans refer to the Inter-Oceanic Region, which includes the "traditional watershed" and the Canal buffer zones.

costs due to inefficient resource allocation. Instead of a Plan as such, the Watershed priorities may be better served by the delineation of strict guidelines and criteria to which commercial development in the PCW would need to comply.

Figure 3

ARI REGIONAL PLAN LAND USE REALLOCATION



Should, a national dialogue reveal that the Panamanian people endorse the Plan's allocation by decree approach, the technical soundness of the plan still would need to be reviewed in light of recent findings concerning natural resource management, especially in the tropics.

The Plan calls for the conversion of a total of 172,000 ha, including 142,000 ha of pasture land and 30,000 ha of land previously held by the U.S. military. The Plan would require that most, more than half (52%) of this area be converted into agro-forestry and/or forestry plantations, 17% into sustainable agricultural activities, 14% into urbanizations and 17% into protected areas or Canal buffer areas.

Modern studies of mono-cultural tropical tree plantations, especially of teak, indicate that this activity has negative environmental impacts, exacerbating soil erosion and depletion[9]. In addition, there are additional concerns over the suitability of teak on the Watershed's soils, as well as the commercial viability of such enterprises.

[9] Guillén, Leyson and William McDowell, op cit.

Recommended Action: To facilitate the completion of their respective mandates, it would be in the interest of both institutions to agree, at least initially, in the omnibus Inter-Institutional Agreement which would ensure that:

1. the ACP, through the CICH, would review and approve all proposals under review by ARI, which could affect the water resources of the Watershed;
2. the ACP, through the CICH, would be informed of and invited to participate in any discussions regarding modifications in the Regional Plan; and,
3. include in the TOR for the Integrated Watershed Management Plan coordinator an evaluation of the Regional Plan.

5. Greater Representation and Participation of Civil Society in the CICH

The transfer of the Panama Canal to the people of Panama insures strong and continuing public interest in Canal Watershed management. How the Watershed is used, exploited and protected will be subject to close public scrutiny and oversight by private and political interests.

For many members of the civil society in Panama, the rationale of Article 6 of Law 19 was precisely to ensure open debate and discussions concerning developments, programs and policies related to the Watershed. Article 6 explicitly requires the ACP to coordinate with governmental and non-governmental organizations which have responsibilities and interests in the natural resources of the Watershed. The mandate is as unequivocal as it is demanding. Entities with interests in the PCW are numerous (see Tables D, E and F at the end of this section). In addition, the ACP's predecessor, the PCC, having no such mandate, took decisions internally. Today, the ACP must break from the old closed traditions of the PCC and allow for a far greater degree of openness.

There are practical reasons to insist that new managers of the Canal Watershed incorporate the views and opinions of a wide range of stakeholders. Development of Canal Watershed resources will entail, perforce, a working arrangement between private and public interests. The potential for conflict is high if political interests are subverted to closed exploitation. If the emerging Panamanian civil society perceives itself as excluded from deliberations regarding the well-being of the Watershed, the CICH and the ACP will find themselves targets to a barrage of unfavorable and acrimonious publicity, distracting attention and resources from effective Watershed management.

There are two prevalent forms of decision-making used by watershed organizations: formal, majority rules decision-making and informal consensus-based decision-making. Increasingly watershed management organizations are using consensus-based decision-making with great effectiveness. Often the consensus-based decision-making is linked to the use of a committee structure that involves representatives from member agencies and key stakeholder groups.

Recent experiences in Mexico and Brazil underscore the value of incorporating stakeholders into the decision-making process. The Lerma-Chapala River Basin Council has gone to great effort to formally integrate major user groups into the decision-making process. User groups have their own Executive Council that chooses user group representatives to the River Basin Commissions. They also have sectorally and geographically based committees and sub-committees. In Brazil, the National Water Resources Management Act of 1997 established that water resources management shall be decentralized and specifically mandate the creation of river basin committees that have stakeholder representation. It authorizes the creation of water agencies that are the executive branches of the river basin committees.

Several issues need to be considered regarding greater participation of the public and stakeholders. Stakeholders benefit from direct access to decision-makers. In this regard, one or more stakeholder representatives could be members of the CICH. In the case of Panama, where there is a wide range of stakeholder groups, including resident communities, small-scale farms, large residential developers, international eco-tourism concerns, etc., alternative access to decision-makers could be considered. For example, in the Chesapeake Bay Program, citizens' and local governments' advisory committees have direct access to the Program's executive committee. The Lerma-Chapala River Basin Council incorporates a significant number of representatives of the user groups directly to the Council.

The CICH offers the potential to serve as one of the principal conduits for the ACP to ensure all parties, possessing vested interests in the watershed, participation in its sustainable development."[10] Building a framework for civil society participation in the planning process for watershed management will require a strong commitment from ACP management and the ACP Board of Directors. Engaging in such a process is necessary to achieve the "sustainable" goal of Law 19.

[10] "Institutional Support for the Sustainable Environmental Management of the Panama Canal Watershed" by Kathryn Herold González Revilla. February, 2000.

Recommended Action: Measures taken by the CICH to broaden its scope could include:

1. To expand CICH membership to give representation to the private sector;
2. To provide for open forums to which interested parties may make presentations to the CICH members and participate in discussions;
3. Within the CICH Secretariat, dedicate a staff member to maintain contact with the local communities living within the Watershed; and
4. Participate in the ANAM Municipal Environmental Plan process.

Table 4 Primary NGO's in Panama with vested interests in PCW

ANCON	National Assoc. for Nature Conservation
APEMEP	Association of Indigenous NGO's
Asociación para la Promoción de Nuevas Alternativas para el Desarrollo (APRONAD)	Assoc. for Promotion of New Development Alternatives
Centro de Estudio y Acción Social (CEASPA)	Center for Study and Social Action CEASPA
Fundación ANDE	ANDE Foundation
Fundación de Parques Nacionales y Medio Ambiente (Fundación PANAMA)	National Parks and Environment Foundation
Fundación NATURA	NATURA Foundation
Fundación para el Desarrollo Sostenible de Panamá	Foundation for the Sustainable Development of Panama
Fundación para la Protección del Mar (PROMAR)	Foundation for the Protection of the Ocean
Iglesia Católica (CARITAS Arquidiocesana)	Catholic Church (CARITAS Arquidiocesana)
Patronato del Parque Natural Metropolitano	Sponsor for the Metropolitan Park
Programa Rural de Acción Social y Desarrollo (PRASUE)	Rural Program for Social Action and Development
Sociedad Audubon de Panamá (SAP)	Audubon Society of Panama
Sondear de Panamá	Sondear

Table 5 Other Government Agencies in Panama with vested interests in PCW

Autoridad de Marítima de Panamá (AMP)	Maritime Authority
Ente Regulador de los Servicio Públicos (ERSP)	Regulator of Public Services
Fondo de Inversión Social (FIS)	Social Investment Fund
Instituto de Acueductos y Alcantarillados Nacionales (IDAAN)	Water Supply and Sewerage Agency
Instituto Panameño de Turismo (IPAT)	Panamanian Tourism Institute
Instituto Nacional de Cultura (INAC)	National Institute of Culture
Instituto Smithsonian de Investigaciones Tropicales	Smithsonian Tropical Research Institute
Ministerio de Comercio e Industria (MICI)	Ministry of Commerce and Industry
Ministerio de Economía y Finanzas (MEF)	Ministry of Planning and Economic Policy
Ministerio de Educación (ME)	Ministry of Education
Ministerio de Obras Publicas (MOP)	Ministry of Public Works
Ministerio de Salud (MINSA)	Ministry of Health
Ministerio de Vivienda (MIVI)	Ministry of Housing
Ministro de Gobierno y Justicia	Ministry of Government
Universidad Nacional	National University
Universidad Tecnológica	Technological University
Zona Libre de Colón	Colon Free Zone

Table 6 Other Government Projects relevant to future management plans of PCW

Estrategia Nacional del Ambiente (ENA)	National Environmental Strategy
Plan Regional y Plan General del Uso de Suelo	Regional and General Plan for Land Use
Estrategia Nacional de Biodiversidad	National Biodiversity Strategy
Estrategia Nacional de Turismo Patrimonial TCI	National Heritage Tourism Strategy TCR
Colón 2000	Colon 2000

6. The Potential Evolution of the Role of CICH and Funding Implications

As stated in Law 19, the ACP will provide administrative support to the CICH, as well as will allow the CICH to seek funds from other sources, national and international, through the aegis of the ACP. But the Law leaves the responsibility of the identification of its funding sources to the CICH itself.

The ACP has agreed to fund the CICH for approximately its first two years of operation. To ensure long-term viability and to maintain a degree of independence, the CICH will need to generate some or part of its own financial resources. During this period, the CICH would have sufficient time to identify, approach and establish other funding sources. As CICH does not yet have a legal personality, or a "*personería jurídica*", it cannot directly solicit nor receive funds from sources outside of the ACP. Lacking a "*personería jurídica*", CICH would need to seek funds through the ACP.

CICH funding requirements would be a function of the interpretation given to its mandate. Under the most limited interpretation, Scenario I, the CICH would carry out coordinating and supervisory functions, as well as be an important forum for deliberation and consensus building among the entities engaged in the Watershed. In addition, the CICH would be a "clearinghouse" for environmental data related to the conditions of the Watershed. Most activities in the field would be executed by other entities, some of which would be CICH members.

As such, the CICH would consist of its members and a secretariat. This Secretariat would be composed an Executive Secretary, a Secretary, an Administrative Assistant, a Data Manager, a Project Officer, and a Financial Officer and the ACP could provide appropriate administrative and logistical support. Funding would come initially from the ACP. Direct annual allocations made by the ACP, based on a budget submitted annually by the CICH, would be the CICH's most likely financial source to cover its basic operational costs as envisaged under Scenario I. However, other CICH members should also be encouraged to contribute to its operating expenses. Contributions from CICH members, in addition to the ACP, would provide for a measure of equity in the relationship among the Commission's membership. Such equity is desirable for the Commission to function effectively.

Estimated annual costs for such a Secretariat would be $500,000. This would cover primarily the salaries and employment benefits of the core staff as well as the costs associated with operation of the Environmental Information Center.

Under Scenario II, the CICH would expand its mandate. Concomitant with the greater responsibilities would be increased financial needs and the need to seek additional funding sources. The enhanced CICH's role would include the following functions:

1. *policy formulation*, which would entail developing and overseeing the formulation of GOP positions with respect to the Watershed on a full range of topics, including air pollution, investment financing and land use;
2. *special projects*, would address particular analytical needs to support policy formulation. In addition, these could include direct small-scale interventions in the Watershed, such as village based forestry management or local training on watershed management; and
3. *watershed monitoring*, to constantly survey the status of the Watershed to identify problems and remedial actions.

Under Scenario II, the CICH would need both operational and program funds. Increased staffing requirements to include a Development Officer/Fund Raiser and a Program Grant manager would raise the annual operating fund requirements to $400,000. Budgetary needs for this program would increase gradually, reaching an estimated $600,000 by the third year of implementation.

During the first two years, the CICH would identify funding sources. Local environmental organizations, such as The Nature Conservancy/Fundación NATURA Endowment (FIDECO), which is mandated to invest 65% of its annual program budget in activities within the Watershed would be an appropriate funding source for the Special Projects.

In addition, CICH could approach other likely donors, such as the Inter-American Development Bank (BID) and the World Bank, as well as bi-lateral donors and international organizations, such as The Nature Conservancy. Many of these institutions could view the CICH as a valuable administrator and coordinator for a wide range of activities implemented through out the Watershed.

The establishment of a trust fund is another financial mechanism available to the CICH. Funds to establish the endowment could be sought among the international

donors and foundations which support environmental/natural resource management activities. In particular, the CICH should explore these possibilities with Fundación NATURA.

An NGO, with "*personería jurídica*", would need to be established to receive and manage the fund. The trust would need to be structured so that the seed money is invested to generate additional resources and that a reputable financial management organization is contracted to manage the account.

Other funding alternatives, whose viability require further investigation, including allowing the CICH to capture revenues stemming from assessments paid by users of the Watershed or its water resources. These options would be strongly opposed by users, as well as other entities, contending their claim to these revenues. Other funding alternatives, such as generating revenue from the provision of "green services", such as the preparation of environmental impact studies or even joint ventures with the private sector in green investments may be feasible if they do not jeopardize the objectivity of the CICH or represent serious conflicts of interest.

Recommended Action: In its first two years, while the CICH has secure starter funds from the ACP. The Commission must put into place a resource generation program that will permanently sustain its activities that reduce the need for budget transfers from member organizations. The Commission should concentrate on "core" revenue steams, e.g. an endowment, international donors and special fund raising events.

7. Establishment of an Environmental Information Center

Watershed management is complex. Therefore, information to help assess the present situation and assist the development and evaluations of solutions is important. The CICH will need two types of informational support: support of operational management and support of strategic policy making and planning. To this end, the CICH will need to develop an Environmental Information Center (EIC) with the capacity to collect, receive, store, update, monitor, analyze and distribute watershed data and information.

Status of Available Data

Geo-spatial Geographic Information Systems (GIS) data concerning the PCW is abundant. However, the usefulness of much of this data is questionable as it is poorly documented. A major challenge will be the homogenization of the monitoring and analysis methods used by the different organizations that collect data.

Perhaps more disturbing are crucial data gaps. For example, there is apparently no data related to water disposal and sewage systems for the Watershed. As a result, there is no way to analyze the consequences of urbanization (fecal coliform counts from failed septic systems, direct sewage discharges, etc.) on the environmental health of the Watershed. The problems in the PCW will most likely be connected to rapid industrialization and urbanization both within and at the perimeter of the PCW.

Another related, but distinct gap, concerns the lack of data on aquifer recharge areas. The hydrologic equilibrium of the Watershed, with its seasonal precipitation pattern and its relatively uniform withdrawal pattern, requires the supply of water for canal operations to come from surface water and groundwater storage. Thus, it would appear important that such aquifer recharge areas be not only mapped for subsequent monitoring, but also for the CICH's consideration of them for priority protection status.

In addition to gaps that are due to the failure to collect such data, there may be gaps in the Center's data that are the result of an incompatibility of data sources.

For example, there is no doubt whatsoever that census information is going to be part of the Center's data collection, but exactly what those data are and how they will be maintained, is unclear at present.

Another apparent gap in the Panama geo-spatial data concerns remotely sensed imagery. Landsat images are expensive to acquire and to interpret into useful products. Currently, this is only being done in two governmental agencies, ACP and PMCC (ANAM), and in ANCON. The latter is a special case; ANCON is concerned with environmental conditions in the watershed as well as the entire country. They have a great deal of project-level data that could be of potential use to the CICH, but even more important is their potential to carry out investigations using CICH data. It is not unlikely that they could become a principal client of the Data Center as well as a major contributor.

Information Transfer, Sharing and Distribution

The task of transferring data between institutions could be a simple operation at first, by recording data in CD's and transporting it in this fashion between institutions. A catalog of available data should be published by the CICH Center when the data is residing in their facilities to acquaint possible users with the information available for their use.

The future option for such data transfers could be the internet. The "Red de Desarrollo Sostenible" will be able to provide an internet data transmission solution in the near future which could be available to CICH when CICH is ready and able to functionally serve the needs of its members. Follow-up activities in this field might have to explore the use of this service-provider as there is an issue that can prove politically sensitive. The issue is that the use of "Red" for internet transmissions, using their software facilities, could require that the data in the CICH Center would have a "Mirror" database at the "Red's" server, since they would provide an interface to process data in any format to make it available to users and to update files only when a change has been made to the database residing at the CICH. The advantage of such an arrangement is that if the CICH hardware/software should have a "crash" there is always a complete mirror database at the "Red". Any contractual arrangement with this provider would have to be very specific to allay fears of data misuse or dissemination at the CICH and/or the Government of Panama.

Another challenge is to make the information generated in the Center available to anybody involved or interested. Developments in data-based technology, often in combination with Internet application, can provide powerful tools for data retrieval. A more advanced type of operations support is to combine on-line monitoring with computer models in order to forecast future conditions of the Watershed. Examples are Early Warning Systems, both for water quantity (floods, droughts) and for water quality issues (accidental spills).

Integrated Watershed Modeling for Forecasting and Planning

The development of an integrated watershed forecasting and planning model could be considered for the Panama Canal Watershed. Such a model would need to describe not only the different aspects (quality and quantity) of the physical system, but also the interactions with the socio-economic system. To the extent possible, the socio-economic processes should be incorporated and the impacts of alternative management policies assessed for their socio-economic impacts. The development of a fully integrated tool covering all the relevant impacts (ecological, hydraulic, economic and social) on the basis of a model is hampered by the complexity and the lack of knowledge and data concerning all the interactions and relationships. Yet, models can be developed to permit an integrated analysis of the interaction of the key water management issues at the watershed level.

Recommended Action: CICH would need to develop IAs with the data patrons to formalize the information sharing arrangement. In the case of ANAM, the formal understanding with CICH would need to take into consideration any licensing obligations imposed upon ANAM, which could either require costly fees or obstruct information sharing. In addition, attention, will also be needed to ensure data compatibility.

8. Sustainable Economic Development of the Watershed and Guidelines for Eco-Tourism

The Watershed is situated in the epicenter of commercial development in Panama. It is the nation's most dynamic economic sector, in terms of international investment potential and residential and infrastructure development. Many Panamanians view the Watershed as an excellent chance to claim land or obtain public-subsidized housing. Without careful management, the consequent waste disposal problems will have serious consequences on the water quality levels of the PCW. Others have set their sights on the real estate which, by virtue of the Canal transfer, has only recently been released for commercial development. How these social and economic forces interact in the Watershed will have a tremendous bearing on the ultimate capacity of the Watershed to satisfy the demands for its water resources. These developments will require the enforcement of sound zoning and capacity restraints to protect the Watershed's resources.

One of the most promising economic sectors in terms of potential to promote sustainable economic growth and to protect the Watershed resources is eco-tourism. The Canal and the surrounding parks in the Watershed offer outstanding attractions and opportunities for the development of international and national tourism industries. Managed well, the tourism industry, especially eco-tourism, can make significant contributions to the economy, in terms of revenue and employment, without threatening the environment. But, sound criteria to ensure the manageable growth of such enterprises need to be well developed early on and enforced impartially and effectively.

In 1999, one half million international tourists, an increase of 5 percent over the previous year, visited Panama. While in Panama, their expenditures contributed more than US$0.5 billion to the national economy. Growth in tourism is expected to accelerate as greater access is given to cruise lines to pass through the Canal and to make scheduled stops for passengers to disembark in the Canal ports to visit Panama.

About 13,000 tourists visited the Watershed in 1999, with Americans and Panamanians representing the majority of the visitors. A survey taken indicated that the major attractions included the Sea to Sea Heritage (passage through the

Canal), Camino Las Cruces, Scenic By-Ways, flat water kayaking, Gamboa Marina and the Embera communities of the Chagres river.

The national parks and protected areas of the Watershed hold particular potential for the development of eco-tourism. But because of the critical role these parks and protected areas play in the vitality of the Watershed, policy measures to promote this industry in the Watershed need to be deliberate, well-conceived and professionally executed. In addition, precisely because of the critical nature of the Watershed, any policy decision taken in this regard will require the participation and consensus of all the interested parties, private and public. In this respect, the imated n play a pivotal role in generating the necessary dialogue and consensus.

While each park will need an eco-tourism strategy tailored to its particular characteristics, there are established guidelines for promoting sustainable eco-tourism in protected areas and parks. Natural resource protection is optimized when there is a management strategy in place and park managers and local communities actively participate in making planning decision.

Reaching a consensus and the strict application of these guidelines is a serious challenge. The CICH could serve as the focus for this process. While allowing for the development of the industry, the guidelines serve as restraints to rapid and uncontrolled growth, leading to unsustainable stress and damage to the natural resources. There will be strong pressure from the private developers to relax the guidelines, allow for greater, faster profit generation. At the same time, environmentalists will argue in favor of a slower more measured pace of the development of the industry. These countervailing perspectives will need to be balanced in a forum which will attempt to objectively evaluate the environmental criteria with those of economic viability.

An important output of the consensual process led by the CICH would be the preparation of a Watershed Eco-tourism Strategy Document (WESD). This document would become an official eco-tourism plan for the area. Any development or tourism activity in the area would be in conformity with the Plan. The CICH would serve as the coordinator of an inter-institutional process involving both the private sector and public institutions. Foremost among the public entities would be ANAM, INAC, IPAT, MINSA and FIS.

Below is a strategy the CICH could use to conduct such a consensual process:

- *Plan and Guidelines*
  - Design/extend a regional or national land-use plan that integrates eco-tourism, watershed, environmental and socio- economic priorities.
  - Involve all stakeholders in a participatory or "bottom-up" planning process.
  - Promote consensus-building among the full range of stakeholders.
- *Set Objectives and Assigning Roles*
  - Determine concrete objectives of tourism development based on social, watershed, environmental, political, and economic conditions, problems and opportunities.
  - Resolve and define the roles and responsibilities of the government agencies with jurisdiction over tourism.
- *Set and Map Opportunities/Priorities*
  - Rank areas in terms of their opportunity/priority for eco-tourism, watershed, environmental, and cultural conservation and socio-economic development.
  - Determine priorities by surveying resident, expert and tourist opinion.
  - Create eco-tourism, environmental and community-use maps showing different levels of opportunities/priorities.
- Synthesize Opportunities/Priorities
  - Overlay eco-tourism, watershed and community-use opportunity/priority maps to determine areas of conflicts and opportunities.
  - Synthesize priorities into a land-use plan using a participatory, consensus building approach.
  - Allocate specific land areas to various levels of tourism development or conservation.
  - Prohibit tourism development in critical areas.
  - Formalize land-use plan into law through flexible/sustainable zoning.
  - Create a specific local land-use plan for each development area.

The CICH can play an important role in this process to develop a sustainable eco-tourism strategy. The successful strategy will focus not only on the long-term goals of mitigating the negative environmental and social impacts, but also on making positive and proactive contributions to the well-being of the surrounding communities and local biodiversity conservation efforts.

Recommended Action: The public sector is responsible for guiding the national and regional tourism industries. In this respect, once the CICH has become better established, the institution could play a crucial role.

1. The public sector role should begin with a review of the existing land-use plan, in conjunction with local, regional and international stakeholders. Based on the evaluation, a determination should be made concerning the desirability using administrative dictates to determine resources allocations or the use of sound standards to guide the private sector.
2. Once the mechanism, a land use plan or a set of economic and environmental standards for private sector development in the Watershed, is in place, its success will depend on the implementation of appropriate policy tools and strategies to manage development and ensure that developments comply with regulations and use appropriate practices to mitigate negative impacts and increase positive contributions to community development and conservation.

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Appendix 1

Draft CICH By-Laws

Preamble

Through the authorities vested to the *Autoridad del Canal de Panamá* (ACP) by virtue of Title 14 of the National Constitution, and legislated in Law No. 19 of June 11, 1997 which, among other things, states that, in order for the ACP to coordinate the activities of the government and NGOs in the watershed area of the Canal, the Board of Directors of the ACP would create and establish the by-laws for an Inter-Institutional Commission (*Comisión Inter-Institucional de la Cuenca Hidrográfica*, CICH).

Mission Statement

The following is offered as an initial draft of a *"Mission Statement"* for the CICH. The CICH should discuss this subject internally, and decide upon the most appropriate wording for the definition of its own role.

> "The Mission of the CICH is to serve as the ultimate protector of the Watershed of the Panama Canal, for the benefit of all Panamanians. The Watershed of the Panama Canal can serve as a vehicle for the social and economic benefit of Panama and Panamanians, through the application of proper policies for the management of the Watershed. The CICH will accomplish its Mission through the collaborative efforts of governmental, non-governmental, community-based, private sector, and other interested participants in the Watershed. The CICH will administer, maintain, use, protect, develop, and manage the natural resources of the Watershed, and promote its sustainable development, to assure the effective operation of the Panama Canal, the efficient supply of potable water for neighboring metropolitan areas, the generation of hydroelectric energy, and the maintenance of bio-diversity for future generations."

Purpose

Article 1. The purpose of the CICH will be to:

(a) administer, conserve and maintain the water resources for the operation of the canal and the supply of potable water for the neighboring populations, and to promote the sustainable use of water resources;

(b) coordinate the conservation of the natural resources of the Watershed with the relevant public and private entities; and,

(c) approve the strategies, policies, programs and projects, public and private, which could affect the Watershed.

Function

Article 2. The functions of the CICH will be to:

(d) establish a coordinating mechanism among the organizations having activities in the Watershed;

(e) establish a system of finance and administration of the economic resources for the operation of the Commission and the authorized projects which the Commission considers to be relevant;

(f) supervise programs, projects and policies necessary for the adequate management of the Watershed and to ensure that potential negative impacts are minimized;

(g) evaluate programs, projects and policies in the planning phase or already existing in the Watershed to resolve possible contradictions or duplications; and

(h) establish an environmental information center for the Watershed which will include, among other things, information on projects and programs in the Watershed, and accurate, up-to-date data about the Watershed.

Terminology

Article 3. For the purposes of this document the following terms will have the corresponding meanings:

(i) Administrator: Refers to the Administrator of the Panama Canal Authority;

(j) Board of Directors: (*Junta Directiva*): Refers to the Board of Directors of the Panama Canal Authority (ACP);

(k) Commission (CICH): Refers to the Inter-Institutional Commission;

(l) Cuenca del Canal de Panamá: PCW, as defined by national law (Law 44, 1999);

(m) Environmental Impact Evaluation: Systematic identification of the potential negative and positive environmental impacts of proposed projects, plans and programs, related to the physical-chemical, biological, cultural and socio-economic aspects of the integrated environment. The purpose of the process is to propose and select the best alternatives which, in compliance with the proposed objectives, optimize the benefits and reduce the undesirable environmental impacts;

(n) Open Forum: A regular or extraordinary meeting of the CICH when specific non-members are invited to attend;

(o) Technical Committee: Any specialized and expert committee convened by the Commission, with the concurrence of the Administrator or his/her designee, to work under the terms of reference as prepared by the Commission.

Commissioners

Article 4. The CICH is to be presided by the Administrator of the ACP or his/her designate and is to be made up of the following Commissioners:

(p) Minister of Government and Justice

(q) Minister of Housing

(r) Minister of Agricultural Development

(s) Administrator General of the National Authority for the Environment

(t) Administrator of the Interoceanic Regional Authority

(u) Head of Fundación Natura

(v) Representative of Cáritas Arquidiocesana

Article 5. The government entities are to be represented by the Minister or Viceminister, Administrator or Sub-administrator. The non-governmental organizations are to represented by the members as designated by their Board of Directors, on the bases of their merits, experience and professional qualifications.

The following presents a profile of the characteristics considered to be important for the members, in order for the CICH to be an effective body:

- To have legitimate authority in his/her own right, and respect of other participants;

- To have technical capabilities regarding the matters of concern to the CICH;
- To have capacity for interpersonal relations dealing with a diverse group; and
- To be known and respected personally, within and outside the institution he/she will represent, for his/her capabilities and integrity.

Article 6. As Commissioners, they will receive neither salary nor compensation for expenses, nor per diem.

Attributes and Number of Commissioners

Article 7. The Board of Directors may review the relevancy of the membership of the CICH. On the basis of this review, the Board of Directors, with a majority vote, may change the number of the Commissioners and their attributes. The Board of Directors may consider the inclusion of Commissioners from any and all sectors, public, including other government entities, and private, such as business people, and representatives of community-based organizations.

Duration of Terms and Suspension or Termination

Article 8. Commissioner will serve as long as he/she holds the post of Minister or head of an entity that is a member of the CICH.

Article 9. The Board of Directors of the ACP may, through a unanimous vote, decide to terminate the term of a Commissioner if it is deemed that the Commissioner has been negligent in, or unfit to carry out his/her obligations to the Commission. The Board of Directors must then replace the Commissioner with a suitable substitute.

Duties and Obligations

Article 10. The Commissioners shall attend regular and extraordinary sessions of the Commission. In the absence of the Commissioner, a professionally qualified designate, nominated by the Commissioner, shall attend the sessions.

Regular and Extraordinary Sessions

Article 11. Regular sessions of the Commission shall be convened on the first Wednesday of every month.

Article 12. Two or more Commissioners can convoke an extraordinary session of the Commission by means of a written request directed to the Executive Director of the CICH.

Obligations of Each Commissioner with Respect to Plans, Projects and Developments within the PCW

Article 13. Each Commissioner shall ensure that, prior to final authorization, all environmental impact evaluations of projects, programs or strategies for the Watershed which: (1) could have impacts upon the water resources of the PCW; and (2) have been approved by the review process of the respective Commissioner's entity, be submitted, through the CICH, to the ACP for its final approval.

Article 14. Each Commissioner shall ensure that, prior to final authorization of any proposed development which could affect the water resources in the PCW and falls under the review of the respective Commissioner's entity be submitted, through the CICH, to the ACP for its approval.

Article 15. Commissioners shall ensure that, prior to final authorization, all environmental impact evaluations which: (1) are to be built on or could affect the banks of the Canal; and (2) have been approved by the review process of the Commissioner's entity, be submitted, through the CICH, to the ACP for its final approval.

Article 16. The CICH would transmit the ACP's consideration and decision, including the terms and conditions, concerning the proposed development, plans or projects which could affect the water resources of the PCW to the relevant institutional entities.

Article 17. The Commissioner would ensure that the decision of the ACP is respected and duly and accurately represented in any license, concession or authorization concerning the relevant development, plan or project.

Article 18. In the case that the Commissioner differs with the findings of the ACP concerning a particular proposal, the Commissioner can submit its position, through the CICH, to the ACP for a second review.

Environmental Impact Evaluations of Non-CICH Members

Article 19. The Commission shall enter into an agreement with all relevant public entities, including non-members of the CICH, to ensure that prior to the granting of the final authorization from the Government of Panama, all environmental impact evaluations for projects, plans and programs which: (1) could affect the water resources of the PCW and (2) have been approved provisionally within the entities' internal evaluation process be submitted to the Commission, for: (1) its evaluation and review; and (2) final submission to the ACP for its approval and final authorization.

Article 20. The Commission shall enter into an agreement with all relevant public entities, including non-members of the CICH, to ensure that prior to the granting of the final authorization from the Government of Panama, all environmental impact evaluations which: (1) are to be built on or could affect the banks of the Canal; and (2) have been approved by the review process of the Commissioner's entity, be submitted, through the CICH, to the ACP Board for its final approval.

Article 21. The Commission shall review and make recommendations to the ACP concerning all environmental impact evaluations of all projects, programs and plans with having potential environmental impact on the water resources in the PCW.

Dispute Resolution Between Commissioner or other Entity, and the CICH

Article 22. Should a decision which is satisfying to both entities not be reached, the CICH may recommend to the Board of Directors of the ACP that the issue be presented to the *Procuraduría de la Administración.*

Submission of Progress Reports

Article 23. Each commissioner shall submit to the Commission Progress Reports of projects and programs, under the competency of the Commissioner's entity, which are being implemented in the PCW, on a quarterly basis.

Article 24. Each Commissioner shall appoint a representative within the Commissioner's entity to follow the programs, projects and activities falling within the mandate of the Commission.

Open Forum

Article 25. At the request of more than two members of the CICH, non-members may be invited to attend a regular or extraordinary meeting of the CICH.

Technical Committee

Article 26. With the approval of the Executive Director, the CICH may convoke Technical Committees to lend support to the CICH in its consideration of particular topics or issues related to its mandate. Membership, terms of reference and duration of such ad hoc Technical Committees are to be determined by the CICH. Membership may include parties from both the private and public sectors.

Regional Councils

Article 27. The CICH may organize Regional Councils to establish effective partnerships between the CICH and residents in the Districts within the Watershed. The Terms of Reference for these Regional Councils will be drafted by the CICH and approved by the ACP Board.

Decision-Making Process and Conflict Resolution within the Commission

Article 28. Decisions and resolutions of the Commission are adopted by a favorable vote of the majority of its members voting.

Article 29. Conflicts within the CICH may be resolved through an appeal to the Board of Directors.

Coordinating Mechanisms

Article 30. To strengthen coordination among the institutions interested in the PCW, the Commission, with the approval of the Administrator, shall use instruments, such as the memorandum of understanding or an agreement of

technical cooperation, between the CICH and the relevant entities, members and non-members of the CICH. Such instruments will cover such areas as (1) information and data exchange; (2) submission to the ACP of proposed plans, projects and developments which could affect the water resources of the PCW which fall under the jurisdiction of the signatories; and (3) in the case of CICH members, obligations and duties related to membership of the CICH.

Sanctions

Article 31. In accordance with the Organic Law 19, Article 127, the Commission may consider the imposition of a fine for actions which threaten the safety of the Canal and make their recommendations accordingly to the Administrator.

Article 32. The Commission shall monitor and review any and all activities which may negatively affect the water resources in the PCW and, when appropriate, recommend to the competent entities of the Panamanian Government that appropriate punitive measures be taken.

Environmental Sampling

Article 33. The Commission shall enter into arrangements and agreements with the competent entities regarding the needs of the Commission to extract environmental samples from the PCW.

Permanent Secretariat

Article 34. A Permanent Secretariat shall be established as an integral component of the Commission, to service the Commission's administrative, secretarial, statistical and record-keeping needs. The Secretariat shall be responsible for all arrangements related to the regular and extraordinary meetings of the Commission as well as the support needs of the Technical Committees.

Article 35. The full time staff of the Permanent Secretariat shall consist of the: (1) Executive Secretary; (2) Administrative Assistant 3) Secretary; (4) Data Management Specialist; (5) Field Officer; and (6) Financial Officer.

Environmental Information Center

Article 36. The Commission shall establish an environmental information center of the PCW, which will include, inter alia, information related to projects and programs to be developed, or existing in the Watershed, as well as physical, chemical, biological, natural resources, and other pertinent data with respect to conditions in the Watershed. Data for this center shall be furnished through various entities, both public and private, as provided for in the relevant memorandum of understanding between the ACP and the relevant entity.

Article 37. The Data Management Specialist of the Permanent Secretariat shall manage and update the Environmental Information Center and be responsible for data collection and dissemination in the form of quarterly reports to be distributed to all the Commissioners and all entities, which provide data to the Center.

Environmental Outreach Programs

Article 38. The Commission shall make arrangements, enter into agreements and design programs with the competent entities regarding the implementation of environmental outreach programs in the PCW.

Special Projects

Article 39. The Commission, with the approval of the Board of Directors may consider the implementation of special projects, including studies, related to the conservation, administration, and maintenance of the water resources of the PCW.

Article 40. The CICH, with the approval of the Board of Directors, may act as an advocate for funds to finance Special Projects. Funding sources would include, inter alia, international, and multi- and bi-lateral donors, public and private banks and foundations.

Article 41. The Commission, with the approval of the Board of Directors, shall consider the desirability of establishing an endowment to fund special projects and programs.

Financial Arrangements

Article 42. The ACP will provide the initial logistic, administrative and financial support to maintain the effective operation of the Permanent Secretariat and the Environmental Information Center.

Article 43. The Commission will be subject to the fiscal controls and procedures as established by the ACP.

Amendments

Article 44. These by-laws may be amended when the CICH considers it to be convenient. Commissioners will receive a written draft of the proposed changes within no less than 14 days prior to the meeting in which they will be discussed.

Appendix 2

Preliminary Strategy For Management Of The Panama Canal Watershed

Executive Summary

Transfer of ownership of the Panama Canal to the Government of Panama presents new opportunities and challenges. Keeping the Canal open for worldwide shipping, the strategic goal that guided Canal operations from its beginning until the signing of the treaty in 1977, remains as a paramount objective but can no longer serve as the single management goal. Expectations are that the transfer of Canal lands, housing, buildings, and control over Canal operations will result in shifting priorities, favoring greater economic and social development for the people of Panama. There is now a greater concern for the developmental impact for the people of Panama as well as the need to protect the Panama Canal Watershed as a source of water for canal operations and potable water for Panama and Colon.

The water from the Canal Watershed is used for operations of the Canal with limited and smaller demands for urban water supply and power generation. The Panama Canal Authority has been given special rights over decisions on use of the Watershed and uses the water for canal operations free of charge. Management of the Watershed is a shared responsibility. The enabling legislation for the Canal calls for the Canal Authority to create and convene a Coordinating Committee (CICH[11]) of interested parties to address watershed management decisions. The CICH represents an official interface between the private operations of the Canal Authority and key public and private entities of Panamanian society.

The specific role (s) of this CICH, under the chairmanship of the Canal Administrator, are still under review. Strategic choices for the CICH and the

[11] CICH is the Comisión Inter-Institucional de la Cuenca Hidrográfica or the Inter-Institutional Commission for the Hydrographic Watershed.

management of the PCW can be explored and delineated. Two possible scenarios for CICH strategic goal definition are presented. The strategic goals for the PCW can be achieved through a systematic process of developing and implementing an Integrated Plan for Management of the Panama Canal Watershed. The preparation of such a Plan is one of the key recommendations of this document. It is recommended that the CICH place on its agenda, the preparation of Terms of Reference for an Integrated Watershed Management Plan, and that the CICH considers as an interim-term (5 –7 years) goal the implementation of this Plan.

This document discusses several factors that the CICH must consider as it makes decisions concerning the Watershed. These factors include: The state of the Watershed; including the water, forest cover and population; the impact of the policy setting, including macro-economic policies; the legal and institutional setting; the role of stakeholders; and the strategic goals of the CICH.

State of the Watershed[12]

Water

The primary purpose of the Canal Watershed, as defined in Law 19[13] is to collect and deliver water for transport of ships from one side of the isthmus to the other and to provide potable water. Up to the 1960's, the Watershed was home to very few people and management was not an issue. Government programs to encourage colonization, and more aggressive land clearing for pasture development and timber in the 1960's and 1970's, caused many scientists to worry about the natural capability of the Watershed to collect, hold, and deliver water for the canal. The scientific community was also concerned about the destruction of natural habitat and the loss of potentially valuable flora and fauna, valuable for scientific as well as commercial reasons. This sparked two primary actions: (1) the collection of hydrologic data and related land use data and (2)

[12] The discussion in this paper focuses principally on the hydrogeographically-defined 326,000 Panama Canal Watershed that is the current water supply source of Panama Canal operations. In 1999 Law 44 was passed which expanded the politically-defined boundaries of the watershed by more than 200,000 hectares in order to assure an additional supply of water for Canal operations in the future. The additional hectares are actually in adjacent watersheds. The CICH's mandate includes all of the expanded watershed area.

[13] "Analysis of Legal and Policy Needs of the CICH, a Working Paper" by Felix Leon Paz and Peter J. Illig. February, 2000

establishment of the first of several national parks and nature preserves in the Canal Watershed.

As a result, the quality of data on geo-physical processes and land use available for the Canal Watershed is exceptionally good. More significantly, land use in the upland areas is largely protected natural forest, and most other lands are in perennial vegetation --pasture grasses or shrubby fallows locally called '*rastrojos*--.[14]

In order to evaluate the state of the Watershed and its water resources, four questions can be posed.[15] The first three address the quantity of water produced by the Canal Watershed. The fourth explores the quality of water. Very brief summaries of the responses are given here.

1. *Are Watershed water yields threatened by deforestation of the current land use pattern?* Even with complex water cycles, the evidence says that (a) annual water yield is unlikely to increase due to reforestation of pasturelands; (b) land use changes apparently are affecting seasonal runoff patterns; and (c) if the storage capacity of Alhajuela and Gatun reservoirs is sufficient, then this seasonal difference in water yield is not critical to Canal operation or potable water supply in Panama City or Colon.
2. *Do erosion rates from existing land uses threaten soil productivity or downstream resources?* (a) Existing dominant land uses in the Canal Watershed, including natural forests, managed pastures, and shrubby fallows appear to be effectively protecting the soils from erosion with some exceptions; (b) Annual cropping with clear cultivation on steep slopes is extremely rare in the Watershed… ; and (c) the promotion of teak plantations in the Watershed, which has apparently converted several thousand hectares to this use in the last ten years, may be putting the soils at considerably more risk of erosion than the existing land uses.[16]

14 McDowell, W., 2000. "Watershed Management and the Panama Canal: Preliminary Findings on Critical Natural Resource Issues, Institutional Support for Sustainable Environmental Management of the Panama Canal Watershed Project," (Technical Report). Prepared for International Resources Group by Winrock International.

15 Ibid.

16 Ibid. McDowell points out that closed canopies in teak plantations can shade out ground cover and expose bare soils to extremely high erosion potential. This phenomenon was observed in one ten year old teak plantation.

3. *Has changing land use affected the sediment delivery to the Watershed's storage reservoirs?* The two principal reservoirs, Gatun and Alhajuela, are not endangered by excessive sedimentation from the Watershed.

4. *What is the probable effect of changing land use on water quality in the Watershed surface waters?* (a) Water quality problems in the Watershed have increased dramatically in certain areas of the Watershed during the last 25 years as urbanization and industrial use of the Watershed, especially the corridor of the Trans-Isthmian highway, have increased; (b) These water quality problems are apparently not being addressed by basic sanitation programs; and (c) Due to the rapid growth of the Trans-Isthmian highway corridor, with its easy access to Panama City and Colon, the water quality problems now being detected are likely to get much worse and more widespread unless serious actions are taken.

The capacity of the Watershed to capture, store, and release water remains high. Costly remedial actions are not necessary under current conditions. However, water quality is under threat and mitigation and/or remedial actions are necessary.

The Forest Cover[17]

Almost half of the "traditional" Canal Watershed is in tree cover in spite of rapid deforestation beginning in the 1950's. There are almost no "bare" lands, lands without some sort of vegetative cover. In forested areas there is a high degree of plant diversity; 1,125 different species were identified and 200 considered "rare". One measure of the value of the Watershed is the production of biomass for carbon fixing.[18]

Almost 70 per cent of the forested lands lie within national parks and preserves. The Chagres National Park, on the eastern side of the Canal, is home to 55 per cent of the forested lands, 80 per cent of the protected forests. The National Parks, as well as contiguous areas of the Watershed, are home to a wide range of fauna.[19]

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[17] "La Cuenca del Canal: Deforestación, Urbanización y Contaminación." Proyecto de Monitoreo de la Cuenca del Canal de Panamá. Sumario Ejecutivo del Informe Final. Heckadon-Moreno, Stanley. Instituto Smithsonian de Investigaciones Tropicales, 1999.

[18] One estimate puts it at US$290,400,000. Ibid. p. 42. This estimate may be high but the value of the watershed biomass for carbon sequestration is significant.

[19] Ibid. see pp 47-54.

People and the Watershed

Population growth has had major environmental consequences for the Panama Canal Watershed. Migration has accounted for most of the population growth in the Canal Watershed over the past forty years. The 1950 population within the confines of the Watershed was estimated at almost 22,000 people; by 1990 over 113,000 people were counted.

Almost 80 per cent of the Watershed population live in the eastern side of the Canal and 62 per cent of these live within a 2.6 kilometer corridor along the Trans-Isthmian highway. It is the highway and easy access to Panama City, and the fast growing Colon area on the Atlantic side that makes this part of the Canal Watershed attractive to spontaneous housing. These two urban centers, which are outside the Watershed, serve as centers of population and urban growth along the Trans-Isthmian corridor. In addition, they represent a significant and rapidly growing demand for potable water from the Panama Canal Watershed.

The areas along the rivers Chilibre and Chilibrillo account for 50 percent of the people in the Canal Watershed. This is the most industrialized area in the Watershed and produces a high degree of waste. Porcine and chicken production sites sit near a natural gas bottling plant, cement plants, and several smaller workshops including foundries, mechanics, and small cement block fabrication. Fortunately, the major source of water for Panama City is the intake in Lake Alhajuela, upstream from this industrialized area.

Panama Canal Watershed Management Issues

Population growth, urbanization, industrialization, and agricultural and forestry activities all impact on the state of the Panama Canal Watershed. All raise issues that may need to be addressed by the CICH. Figure 1 identifies some illustrative management issues.

Figure 1 Illustrative Watershed Management Issues in the PCW

Type of Human Activity	Illustrative Management Issues
Population Growth	Increased water demand, air and water pollution, colonization, waste water management, solid waste management.
Urbanization	All of the above; plus land disturbance; environmental damage; contamination; permitting.
Industrialization	All of the above; plus hazardous waste; environmental impact on biodiversity; public education; permitting.
Infrastructure	Watershed disturbance, potential pressures, contamination, Benefit/Cost analysis, environmental impact studies, cultural impacts.
Agriculture & Forestry	Deforestation, agro-forestry management, pollution, water demand, erosion and siltation, bio-diversity effects, education, sustainable agriculture.
Mining	Erosion, contamination, licensing.
Land Use Zoning	Regulation, monitoring, incentives, enforcement, participative planning, high costs, cultural issues, public education.
Eco-Tourism, Protected Areas	Environmental education and monitoring, demand studies, impacts on bio-diversity and watershed protection.

The Policy Setting

A Policy History and the Canal Watershed

Economic policies in Panama before the 1950's, as in other Latin American countries, maintained the *status quo* with few steps toward economic development. Fiscal policy restrained government spending by the limited revenue from duties on imports and exports. Policies to guide use of natural resources were non-existent. In Panama, operations of the Panama Canal stimulated different economic conditions:

- the Canal generated demand for industries to service the movement of ships through the Canal, creating a large and sophisticated service sector in Panama;

- a larger percentage of the population resided in urban areas, employed by Canal operations;

- parity between the U.S. Dollar and the Balboa simplified exchange rate policy and put limits on the monetary policy.

As in other countries, a more activist role for the central government to lead economic development began in the late 1960's. Until then, government policies had little effect on the state of the Watershed. Water quantity, quality, and life forms in the tropical forest were largely undisturbed by human intervention. Watershed management was practiced passively by the Panama Canal Commission by monitoring water flows and sediment loads.

Population density in the PCW

This situation changed dramatically by the 1970's with an increasing migratory flow into the Panama Canal Watershed, in part because of the improvement of the Trans-Isthmian highway. In addition, availability of free land led to clearing of tropical forests for agricultural use. Credit policies, supported by international and bi-lateral soft loans, financed conversion of land to pastures and livestock production. Establishment of asentamientos campesinos, a form of communal farming supported by the government, also accelerated land conversion.

There was also a linkage between macroeconomic policies and agricultural development programs. Tariff policies (duties and quotas) were used more directly to protect domestic producers from cheaper imports (import substitution policies). Credit policies provided producers with subsidized credit, paid for by higher rates on consumer and commercial loans. The result was higher food costs for consumers and lower real wages for workers.

These economic policies stimulated the loss of much of natural forest; in this regard the policies were successful. Forests in the primal state were non-productive, from the contemporary viewpoint, and even low yielding pastures were seen as an improvement. The demand for food production, exports, and employment provided the political support for an active colonization policy.

The effects of government programs and policies, and the changes in programs and policies, can be loosely associated with the rate of transformation of the tropical forest.

Table 1 Rate of Forest Transformation (Hectares per year)

Period	Policy	Rate per year
1952-1976	Colonization	4,300 has/yr.
1976-1984	Agric. Development	2,600 has/yr.
1984-present	Watershed Protection	500 has/yr.

Spontaneous colonization as well as active government promotion of colonization transformed an average of 4,300 hectares of clearing a year, mostly for pasture development between 1952 and 1976. Free land and cheap credit along with other government services provided part of the stimulus. This high rate fell to 2,600 hectares under more general policies for agricultural development between the mid- 1970's and the mid-1980's. The rate was still sufficiently high, especially when areas east of the Canal began to be targeted by colonists, to stimulate a political shift in resource policy. In the 1980s, the President established a policy to create national parks by executive decree to stop destruction of the forest cover. Much of the Canal Watershed, at least on the eastern side, was declared off limits to colonization.

In the Western Watershed the impact of national policies to "utilize" the tropical frontier continued into the 1980's and some are in effect today. Public lands can be claimed and passed into private holdings. Even after recognition of the need to protect the Watershed, producers within the Canal Watershed were eligible for special livestock development loans. This policy changed about ten years ago and such land conversion from forest to pasture became ineligible for government-supported loans; the loss of special credits is considered to be one of the contributing factors to the slowdown of land conversions.

The same rate of forest destruction was occurring in other countries and for the same reasons. The presence of the Canal provided an identifiable and practical consequence to the loss of the forest, which is a factor that does not exist in other countries. The political leadership came to believe that if the rate of destruction continued, then some day, sooner rather than later, the Canal would not have sufficient water to operate. This belief led to formulation of active environmental and natural resource policies directed towards conservation and management of sections of the Canal Watershed.

The first and largest of national parks was created in 1984 for the explicit purpose of protecting the sources of water for the Canal. The preservation of the Canal

Watershed became a political icon for the creation of other protected areas. Multiple benefits of the parks were recognized; protection of a major economic institution provided the political means to a broad environmental end, protection and maintenance of environmental riches.

Policy Changes

By the mid-1980's it began to be apparent that Panama, like other developing countries, was unable to sustain the set of economic and social policies to stimulate economic development and provide a wide range of social services. Following conventional wisdom, government institutions "directed" economic decision-making. Subsidies drained national treasuries and increased budget deficits, stimulating inflation; protectionist policies distorted market prices, increased food and other prices to consumers, and discouraged exports. External borrowing to cover budget deficits became more expensive or dried up.

Economic policies began to change in the mid-1980's and accelerated in the 1990's with the adoption of "structural adjustment" strategies to correct "imbalances". Measures were adopted to lower government deficits and reduce government interventions in the marketplace. Tariffs were lowered, and continue to be lowered, removing protection for domestic agricultural production. Credit subsidies were reduced on food and livestock production. Cutting back on government expenditures reduced fiscal deficits. These policy adjustments were and are common throughout the developing world.

The most important long-term aspect of the policies has been the reduced role of the government in economic decision-making, abandoning direct interventions via government fiat in favor of policy tools that *influence* market prices. Although the use of subsidies for credit, tariff protection, and special tax incentives continues, they are used more sparingly. This return to the marketplace has been accompanied by a slowdown in the rate of frontier expansion, shown in the bottom row of Table I. Many factors are likely to have influenced this change but elimination of direct government support, including subsidized credit, is certainly important.

These shifts in macroeconomic policies have reduced the threat to tropical forests and now that the parks are in place, create the conditions for sustainable management of the Canal Watershed. While remnants of the interventionist policies of the past remain, and there are some indications that the current

government may support increased intervention is some areas to protect domestic agricultural production through the re-imposition of high tariffs on food products, the influence of those policies on the Panama Canal Watershed has been effectively countered by the creation of reserves and national parks.

However, even when these parks and nature reserves provide most of the water for canal operation and human consumption for a significant sector of the population, the National Environmental Authority (ANAM) does not receive economic benefits from these services, to help the institution cover the cost involved in protecting these areas and providing environmental education to the communities in and around the parks.

These changes in macroeconomic policies were occurring at the same time that more explicit natural resource management policies and programs were being formulated. The next section describes the state of these natural resource policies.

Resource Management Programs and Policies

Contemporary environment and resource management policies are defined in four major laws:

1. Law 41 created a national environmental authority with expanded functions;
2. The Forestry Law;
3. The Regional Plan for the Inter-oceanic Region contained in Law 21; and
4. Law 19 that created the Panama Canal Authority.

The National Environmental Authority (ANAM). The history of the National Environmental Authority (ANAM) traces the importance accorded to environmental issues in Panama over the past 20 years. Recognition of environmental issues in Panama first led to the 1979 establishment of a department within the Ministry of Agriculture (RENARE) to oversee natural resource programs. This first small step created inevitable conflicts within the Ministry as protection of natural resources clashed with agricultural development, the primary mandate of any Ministry of Agriculture. An autonomous government agency (INRENARE) was created in 1986, moving the conflicts to a higher plane of government. Management of the natural resource patrimony of Panama was the mandate of this Institute, especially the management of new parks. Reforestation was another broad mandate of the Institute.

INRENARE was transformed once again into the National Environmental Authority (ANAM) in 1998, absorbing the natural resource management responsibilities of INRENARE and acquiring broadened authority over public and private land use, and the policy and regulatory responsibilities for enforcement of environmental regulations. The broadening of the environmental mandate from "green" to include "brown" environmental issues mirrored the awareness of a broader set of environmental problems.

Forestry Policy. The 1992 Forestry Law has promoted reforestation by providing substantial fiscal incentives to generally well-to-do private investors. It provides for:

- Exemption from taxes on profits.
- Investment expenses deducted from income taxes.
- Exemption from import duties for required capital goods.
- Exemption from land taxes.
- If bonds are used, the income is tax free
- Subsidized credit.

There are additional reforestation programs active in Panama. The Autoridad de la Región Interoceánica, ARI, has granted concessions for large-scale plantations. Several international donors work with the Ministry of Agricultural Development to promote agro-forestry programs for smaller producers.

In general, there is little evidence that forestry programs have yielded promised benefits. There are some indications that the Forestry Law provides excessive short-term gains. This is suspected to lead to investments made not for the long-term profitability of tree production but for the immediate payoff in reduced taxes or import duties. Domestic markets for tree products are not well developed and the international markets for teak demand quality standards unlikely to be met by the plantings resulting from the incentive program.

The Regional Plan. Management of the Watershed is greatly facilitated by past natural resource policy decisions. The creation of several national parks and nature preserves in the Canal Watershed, concurrent with other policy changes,

added a measure of stability in changing land uses. Clearing of the natural forest was reduced to approximately 500 hectares a year from the estimated 2,600 hectares a year during the ten years from 1976-1984. With much of the proximate Canal Watershed under direct management of ANAM, watershed management calls for monitoring and assessment of water and sediment flows, not major changes in land use.

In the period preceding the transfer of the Canal a plan was prepared under the assumption that the Canal Watershed was stressed and the operation of the Canal was in jeopardy. The Regional Plan was prepared to counter the perceived threat. The regulations have not yet been completed to put the authorization law into effect.

The Plan proposes to restrict economic activity to conform to the physical characteristics of the land, primarily soil types and slopes, in order to minimize erosion and siltation of the two reservoirs that supply water to the Canal. It is now clear that execution of the Plan is not necessary for the protection of the Canal Watershed. In addition, the changes proposed by the Plan would require massive private investments to conform to prescribed land use. Table II reproduces the estimated changes.[20]

Table 2 Required Land Use Changes under the Regional Plan

Actual Land Use, 1995			**Proposed Land Use, 2020**	
Sustainable Agriculture	%	Has. (000)	%	Has. (000)
	0.5	1.877	8.0	30.033
Forestry	0.5	1.877	23	86.345
Livestock	39	146.413	2	7.508

[20] The text and this table are taken from "Economic and Social Polices and the Panama Canal Watershed" by Ronald V. Curtis. Prepared for International Resources Group, Ltd. May, 2000

As noted in the referenced report, "These land use targets are ambitious to the extreme. The rate of forestry development would have to exceed the rate of forest destruction during the period 1976-1984, 2,600 hectares per year. The transformation of pastures to (approved) uses would have to exceed 7,000 hectares per year, almost twice the highest rate of land clearing during the 1950's and 1960's. There is no historical evidence to suggest the types of programs (nor the cost) that could lead to such rapid change."[21]

Even though the underlying philosophy of the Regional Plan fits more in the era of direct government management of the economy than today, the Regional Plan does offer needed guidance for regulation of housing and industry in the Watershed.

Law 19. In June 1997, Law 19 was enacted to establish the Panama Canal Authority (PCA) to operate the Panama Canal. The PCA took over from the previous Panama Canal Commission (PCC) on December 31, 1999. Based on this Law, the PCA is empowered with authorities over the Panama Canal Watershed (PCW) which had not been previously entrusted to the PCC. One instrument for the management of the PCW established in the law is the establishment of an inter-agency body, the Inter-institutional Commission for the Panama Canal Watershed (CICH), to serve as coordinator of the management, conservation, and protection of the PCW and its water resources. The CICH provides an adequate institutional framework for watershed management in the Panama Canal Watershed.

Conclusions

Government policies played a primary role to remove the tropical forest from the Canal Watershed. Free land, subsidized credit, and other government services stimulated colonization. Public policy later stopped removal of the forest from the eastern side of the Canal Watershed by establishing several national parks.

Government policies to manage the **national park system** provide a protective shield for the Watershed. If the parks are managed well, the Canal Watershed is protected. Refinement of government policies to encourage sustainable economic uses compatible with the parks, such as tourism, could provide a continued and sustainable flow of resources.

[21] Ibid., p. 8.

The **Forestry Law** appears to be excessively generous to successful applicants. Within the Canal Watershed, forest plantations will not provide any additional benefits as the rate of erosion is already very low. There is potential for tree production as a higher valued production alternative to livestock. However, domestic capacity to manufacture wood products is not developed and linkages to international markets are weak.

A major review of the **Regional Plan** is necessary before the process of preparation of required regulations is completed. Control of erosion in the Canal Watershed – the goal of this policy tool—is well within acceptable limits. The substitution of administrative mechanisms for private market-oriented decisions to determine how private land is to be utilized in the Canal Watershed is unlikely to be successful. The costs of administrative mechanisms, displaced production, and the social and private costs of producers will be high and cannot be calculated beforehand.

Law 19 provides a mechanism, the CICH, that can be used to manage the Panama Canal Watershed within the existing policy framework.

Legal and Institutional Framework for Watershed Management in the Panama Canal Watershed

The legal foundation for the Panama Canal Authority (ACP) was established on June 11, 1997 with the approval of Law 19.[22] The legislation makes the ACP the supreme executive authority for Canal management and operations while granting only limited authority over the management of the Canal Watershed. In the period following enactment of the Canal treaty properties and authorities of the Panama Canal Commission were transferred to other Panamanian institutions, primarily the Inter-Oceanic Regional Authority (ARI). While dominion over the water was placed under ACP, with priority uses given to the Canal and water needs of Panama City and Colon, influence over decisions on land use within the Watershed is to be exercised through the CICH, albeit under the chairmanship of the Administrator of the ACP. This authority to establish and direct the CICH is contained in the organic law of ACP.

[22] "Analysis of Legal and Policy Needs of the CICH, A Working Paper" by Felix León Paz and Peter J. Illig. February, 2000.

Five functions are identified:[23]

1. to establish a coordinating mechanism among organizations active in the PCW
2. to establish through the ACP a financial and administrative system
3. to supervise programs, projects, and policies needed for adequate management of the Watershed, to minimize potential negative effects
4. to evaluate programs, projects, and policies in the planning phase to resolve possible problems or duplications
5. to establish an environmental information center for the PCW.

Created under the authority of the Board of Directors of ACP, CICH is intended to play an important role in the management of the PCW. In addition to the functions cited above, CICH also:

a. has responsibility for coordinating and monitoring projects that are implemented in the PCW
b. can solicit and obtain, through the ACP, technical support and funding from national and international organizations
c. will receive administrative support to carry out these functions from the ACP.

The complexity of watershed management in general is problematic at best. Multiple use of the Canal Watershed, even with established priorities for Canal operations and as a source of potable water for populated areas, will inevitably lead to conflict. "….(I)t is not uncommon for conflicts of law to appear in the initial efforts of ambitious inter-agency coordination efforts."[24] Clearer specification of the role of CICH is recognized as necessary for efficient operations. "Several policy and legal impediments impact the effectiveness of the CICH to fulfill its mandate….."[25] and include:

a. definition of entities' roles as CICH members
b. private sector representation
c. conflict resolution mechanisms
d. provisions for exceptions to established rules
e. means to resolve legal conflicts or overlapping jurisdictions.

[23] Ibid., p. 5.

[24] Ibid. p. 7.

[25] Ibid.

The legal framework for the Canal was clear in the original treaty when the Canal was built and established a single priority for water use, and by extension, management of the Watershed. Over the years, accommodations were made to supply potable water and to generate electricity. But the needs of the Canal remained paramount.

The organic law of the ACP retains that priority but, as with most political instruments, inserts a compromise. In place of a single priority for the Watershed –supply water for the Canal— he legislation identifies the priority and then "waters" down the statement with a call for sustainable management of the Watershed. And watershed management is to be accomplished "…in coordination with other Government agencies…" or the CICH. The enabling regulation that created CICH states that the "..objective of CICH is to integrate efforts, initiatives, and resources for the conservation and management of the Panama Canal Watershed and to promote its sustainable use."[26]

CICH members include six public agencies and two non-governmental organizations:

1. Panama Canal Authority
2. Ministry of Government and Justice
3. Ministry of Housing
4. Ministry of Agricultural Development
5. The National Environmental Authority
6. The Inter-Oceanic Regional Authority, and
7. Two non-governmental organizations:
    - Fundación Natura
    - Cáritas Arquidiocesana

The agenda of CICH has not yet been established. However, there are obvious connections between several government entities that are members of the CICH and activities in the Watershed. For example, spontaneous and unregulated settlements call attention to the Ministry of Housing; the National Environmental Authority (ANAM) has authority over the national parks and environmental impact studies within the Watershed; the Inter-Oceanic Regional Authority (ARI)

[26] "Analysis of Legal and Policy Needs of the CICH, a Working Paper" by Felix León Paz and Peter J. Illig. February, 2000

is the temporary agency acting as trustee for the transfer of property; and the Ministry of Government and Justice is the central government agency relating to communities in the Watershed. The mosaic of established responsibilities of these central government agencies will, it is expected, be shaped to create a coherent watershed management program.

Government program functions in the Watershed are not limited to members of the CICH. Several other government agencies, ranging from IPAT, the Panamanian Tourism Institute; IDAAN, the water supply and sewerage agency; to the Ministry of Health, are responsible for activities in the Watershed.

Role of Stakeholders in Watershed Management

Management of the Panama Canal Watershed's resources will entail a working arrangement between private and public interests. There are practical reasons to insist that management of the Canal Watershed incorporate the views and opinions of a wide range of stakeholders. CICH offers the potential to serve as the means to identify "……all parties that possess vested interests in the Watershed (as) an integral component of the sustainable development process."[27]

In addition to the public sector organizations and the two NGOs that have been named to the CICH, there are several other private organizations and groups with interests in how the Watershed is managed.[28] These organizations are likely to express interests beyond technical considerations of water storage and forest management. These include the Asamblea de la Sociedad Civil (ASC) which is a non-partisan organization promoting a better future for the people of Panama. A more focused view, promoting commercial interests, comes from the Cámara de Comercio e Industrias and the National Union of Small and Mid-size Enterprises (UNPYME). The broad interests of environmental organizations is expressed by CONAGRA, the National Coordinator of Environmental Groups. Public and private universities and research organizations, will also continue to express an interest in how the Watershed is managed and seek to play a role.

[27] "Institutional Support for the Sustainable Environmental Management of the Panama Canal Watershed" by Kathryn Herold González Revilla. February, 2000.

[28] "Institutional Support for the Sustainable Environmental Management of the Panama Canal Watershed", Kathryn Herold González Revilla. February, 2000.

The decentralization policy of the Government of Panama (which seems to be receiving somewhat less attention under the current administration) has encouraged a more active role for local organizations within the Canal Watershed. There are a variety of organizations, ranging from the Council of Municipalities (AMUPA) to indigenous organizations, with varied and often conflicting interests that should be involved at the local level, as decisions are made on how the Watershed is managed and utilized.

Table 3 Number and Type of Organizations[29] with Interests in the PCW

Central Government	19
National Non-Governmental Organizations	16
Municipal and Community Organizations	7
Research and Educational Organizations	6

A complete identification and description of the PCW Stakeholders appears in a supporting document (Cecilia Moreno, Demographic Trends, IRG 2000). Four major stakeholder groups have been identified: (1) CICH member organizations; (2) the private sector; (3) Watershed residents and their local governments; and (4) Panamanian society at large. Table IV below provides a sampling of the major interests of different stakeholder groups and the potential benefits that could accrue to each group through an effective, successful CICH.

[29] Calculated from Ibid.

Table 4 Panama Canal Watershed Stakeholders

Stakeholders	Benefits
Member agencies: • ACP • ARI • ANAM • MIVI • MIDA • Fundación Natura • Cáritas Arquidiocesana • Ministry of Government & Justice	• Input to design more efficient programs. • Access to funding sources. • Development impact synergies. • Resource leverage opportunities. • Institutional strengthening via training in watershed management. • Access to CICH/PCW database.
Commercial Private Sector	• Policies to enhance long-term return on investment. • Opportunity to be known as an environmentally responsible corporation. • Access to public entities to establish long-term productive partnerships. • Market opportunities
PCW residents: • Indigenous groups • Communities, Local Governments	• Improved land use practices. • Improved social services. • Consciousness increased about benefits and obligations regarding sustainable watershed management • Better quality of water and energy. • Employment opportunities — economic gain. • Improved quality of life.
Panamanian society at large	• Economic impact of the canal 8%-10% of GDP. • Watershed as a source of improved, more efficient energy supply. • Enhanced quality of life via quality of water, recreation and the protection of biodiversity.

Building a framework for stakeholder participation including civil society in the planning process for watershed management will require staff resources and a strong commitment from the CICH Commissioners. Engaging in such a process is necessary to achieve the "sustainable" goal of Law 19. The initial planning for the CICH structure includes the concept of Regional Councils as well as technical committees which may facilitate inclusion of input from a wide range of stakeholders in the CICH decision-making process.

Inclusion of civil society and other key stakeholders into the decision-making process for CICH deliberations does not mean that the ACP loses control over the

agenda of CICH. If done with care and forethought, the CICH will benefit from more active public participation in its deliberations. What it does mean is that clear management objectives for the oversight of the CICH agenda must be established.

Strategic Goals and the Role of CICH

Selection of Strategic Goals

Determination of the strategic goals of the CICH requires careful consideration by the CICH Commissioners of the impact of selection of alternative goals, and the means to accomplish them. Careful delineation of feasible alternative goals is a necessary first step. Two alternatives are presented below.

Basic Requirements

The viability of Canal operations is absolute. A steady and continuous flow of water into the reservoirs is an obvious requirement; maintenance of the flow of water is not.

As described above in the Setting, the capacity of the Watershed to maintain the necessary flow of water at current levels is unchanged and presents no short-term problem. Short-term disruptions cannot be tied to changes in land use in the Watershed and most likely are, as suspected, related to climatic changes induced by El Niño. The measures taken to maintain the flow of water for canal operations can be used again, if necessary. Means to improve the efficiency of potable water delivery and utilization in the cities such as demand management would be more cost effective than expansion of reservoir capacity to meet unpredictable flow requirements.

Instead, cost effective measures need to be taken to maintain the good health of the Watershed as a basic element of long-term strategic feasibility. Continued investment in watershed management is a *"sine-qua-non"* of any of the alternatives discussed below. The operational question for management is how to minimize the required expenditures to assure a continued flow of water. CICH presents the opportunity to build a coalition to meet common goals of watershed management without the full cost burden resting on ACP.

In hindsight, the most important policy action taken over the past two decades was the creation of the national parks and nature preserves within the Canal Watershed. In a single, cost-effective stroke, changes in land use were minimized to maintain a vegetative cover, one that holds and releases water to the storage areas. However, the proximity of the parks to the major population centers of Panama assures that pressures to utilize the land for other economic activities can only grow. Continued and intensive management of the national parks to assure the integrity of their natural state directly serves the interest of the ACP.

Recommendation. The CICH should build political support for the funding of a strong budget for ANAM as manager of the national parks.

The careful collection of information on the state of the Watershed is proving to be invaluable. It permits the ACP, and the government of Panama, to avoid costly measures to "improve" the Watershed. Unlike the Central American countries where changes in land use have resulted in severely deteriorated watersheds with increased flooding and a diminished water table— the Panama Canal Watershed does not require costly remedial actions. The quantity of water produced by the Watershed, even with the changes in land use over the past forty years, appears to be unchanged and remains sufficient for current normal Canal operations.[30]

The value of this information proves that continued monitoring and research of the Watershed is a necessary and cost-effective expenditure. The information has multiple uses for public and private entities. This makes it a strong candidate for financial support by CICH members, not just the ACP.

Recommendation. The CICH should assure a continuous monitoring program for the Watershed. Data collection and analysis, and input into national research programs, should be a shared exercise.

The CICH offers a venue for public participation in the management of the Canal Watershed where public opinion can be channeled constructively for a common goal; sustained utilization of the Canal Watershed. Public participation in watershed management plans is a "*sine-qua-non*" to success.

[30] This assumes that the Government of Panama only selectively implements the Regional Plan, leaving aside the measures which call for transformation of pastures to forests, especially teak plantations.

Unplanned and uncontrolled human practices, be it spontaneous settlements or clandestine dumping of industrial wastes are the greatest threat to the Watershed. The other side of the coin is that preservation of the Watershed becomes a goal for everyone, building community-managed programs for sustainable use of the Watershed reduces public costs.

Recommendation: Public participation by stakeholders, especially civic society, in CICH deliberations is a necessary condition to achieve the objectives of Law 19.

Alternative Strategic Goals for the CICH.

Taken within the context of the objective/vision of the CICH, "to integrate efforts, initiatives, and resources for the conservation and management of the PCW, and to promote its sustainable use," the above functions suggest an operational framework characterized by two possible operating scenarios that would define the Strategic Goals of the CICH.

Base Scenario. The Base Scenario or Scenario I would be comprised of a series of basic activities using a rather narrow definition of potential CICH roles in coordinating and supervising PCW management. These include: (1) performing a coordinating function among entities involved in the PCW; (2) establishing with the ACP a financial and administrative system for CICH operations; (3) supervising programs, projects, and policies needed for adequate management of the PCW; (4) evaluating programs, projects, and policies with PCW impacts in the planning phase; and (5) establishing an Environmental Information Center for the PCW.

These functions would constitute the services of the CICH under Scenario I. In essence, it casts the Commission's primary, and almost exclusive role, as one of coordination and supervision. Under this scenario, the Commission is an important forum for deliberation and "consensus-building" among entities engaged in Canal Watershed use and management matters. It would also serve as a "clearing house" for data, including information on sources of funding, on Canal Watershed Management. Implementation of any PCW rehabilitation and enhancement activities would be carried out by technical line entities, many of whom would be CICH members, such as public sector ministries, Not-for Profit (NGO) organizations, and commercial firms without major programmatic involvement of the CICH.

Enhanced Scenario. Alternatively, or as a result of institutional evolution over a period of years from the Base Scenario, the Enhanced Scenario (Scenario II) would be comprised of the activities of the Base Scenario, as well as a series of more pro-active functions that would move the CICH from a strictly operational role into a more programmatic one. Suggested additional CICH activities under this scenario would include: (1) managing a Special Projects Program to provide such innovations as eco-tourism investment studies, water quality or waste management project studies, parks and protected areas project identification, etcetera; (2) watershed management policy formulation (e.g. water usage, recreational uses, land use conversion, waste disposal); (3) involvement in obtaining development finance resources from the private sector, government, or multi-lateral donor or banking institutions for investments into special projects for the PCW; and (4) pursuit and administration of adequate norms for maintaining the key functions of the PCW.

The CICH could serve as a vehicle, bringing both private and public voices together, to highlight the requirements for remedial actions to arrest and reverse deterioration of the quality of water in the Watershed. The sections of the Regional Plan that deal with housing and industry should be supported by CICH as a necessary component of watershed management. Whether the solution indicates community level sewerage systems, or a trans-isthmus sewerage system, the CICH could provide the programmatic leadership to find the feasible solutions. International financial institutions could be tapped to meet the capital requirements. Solid waste management likewise needs CICH to serve as a forum to promote support for efficient for-profit companies to haul and dispose of trash in a sanitary manner that maintains the visual panorama of the parks as well as water quality.

These kinds of activities can become complex, and can require considerable staff resources. For example, a program to generate, fund, and administer or oversee special projects will find the “arena” a competitive one, in terms of attracting donors, banks, or investors. It is recommended that the entry of CICH into such a program should not be initiated until the CICH has become fully operational.

Applications of Strategic Goals/Preparation of an Integrated Watershed Management Plan for the Panama Canal Watershed.

The mechanism for decision-making about the CICH's Strategic Goals and for the maintenance of the PCW in a condition to be able to accomplish these goals is to prepare and implement an Integrated Watershed Management Plan for the Panama Canal Watershed. Within the context of this Integrated Watershed Management Plan, the Regional Plan, and all of its land use implications (objectives, benefits, costs, levels of implementation, and implementation procedures, etc.) should be evaluated.

The proposal to undertake an Integrated Watershed Management Plan for the PCW is not new. A review of the literature[31] shows that such a program was proposed as early as 1983, and possibly even earlier.

It is now recommended strongly that one of the interim-term (5-7 years) goals of the CICH will be the preparation and implementation of an Integrated Plan for the Management of the Panama Canal Watershed. Such a Plan views the watershed in holistic terms. Objectives are established for the Plan, and criteria are included for the measurement of how well the Plan satisfies the objectives. The needs and problems of the watershed are assessed fully, and the resources and the opportunities for addressing the needs and problems are evaluated. Sophisticated analytical techniques (simulation and optimization models) are applied, using today's computer technologies, in the evaluation of alternatives for watershed management. Public participation is actively sought in the development of the plan through open public forums for discussion purposes. Once an alternative is selected for the Plan, an active program of public information is conducted that encourages public involvement in Plan implementation. With changing conditions over time, the Plan is updated to accommodate new realities. Such updating should be programmed for every five years, or whenever significant changes occur, to warrant an update.

An early agenda item for the CICH should be the preparation of the Terms of Reference for the Integrated Watershed Management Plan for the PCW.

[31] "Evaluación Ecológica de la Cuenca Hidrográfica del Canal de Panamá, ANCON, Marzo 1995, p. 3.

Integrated Watershed Management Plan: Concepts

An integrated watershed management plan can be defined as a plan to protect water resources and water users from the effects of inappropriate land use. The actual status of water quantity and water quality in the Watershed, and the future desired condition of the water resource, should guide the plan. Accordingly, the plan may focus on protection of the existing water resources, restoration of a polluted or degraded waterway, or a combination of those objectives. In the Panama Canal Watershed, there are several sub-watersheds which are degraded and need restoration, but most water bodies are still in good condition, and require a plan which will prevent their degradation.

Developing an Integrated Watershed Management Plan is a complex process because the factors affecting water quality and quantity are diverse, and the stakeholders are often unaccustomed to working together towards common goals. In the case of the Panama Canal Watershed, numerous national agencies, NGOs, local governments, communities and private development interests are important stakeholders. Water quality and sedimentation are key concerns. In order for these diverse groups to develop a coherent plan for addressing these issues in a large watershed like that of the Panama Canal, the following principles will be keys to success.

Goals Focused on Water Resources

Watershed programs can be complex, but to be successful they need to be focused on a few clear goals. These goals should articulate the desired status of the key waterways in the watershed (e.g. “prevent the eutrophication of Lake Gatun,” or “maintain water quality suitable for safe recreation and raw potable water supply in the Chagres River”).

In order to attain these goals, the program may become involved in urban or rural development projects which promote certain types of economic development in certain sub-watersheds. But the watershed program itself must not be diverted into economic development activities which are not explicitly linked to a water quality goal (e.g. reforestation projects should be targeted at specific water resource problems in specific sub-watersheds).

Science-based Program

A watershed plan should evolve from a focused scientific assessment of water resource problems in the Watershed. Specific water quality problems, their magnitude, and the specific threats which they pose must be scientifically documented and evaluated. Baseline data must be collected to serve as a basis for future changes in the water resource. Development of water quality goals and targets also should be based on strong scientific evidence. For example, the capacity of large rivers (e.g. Chagres) and reservoirs (e.g. Lake Gatun) to absorb contaminants without causing a decline in their existing high water quality needs to be determined by rigorous limnological studies. Once the critical tolerance levels are determined for the downstream water bodies, the allowable loads of each contaminant from each sub-watershed can be estimated. These loads can become a key part of the target (e.g., not more than 50 lb/day of total phosphorus will be discharged from the Gatuncillo sub-watershed).

Prioritization of Sub-Watersheds

In a large watershed like the Panama Canal Watershed, the land use and socio-economic conditions vary tremendously from place to place. In order to develop a reasonable watershed plan under these circumstances, it is imperative to break up the watershed into smaller planning units (sub-watersheds). Specific problems within each sub-watershed are then evaluated for their potential effect on key downstream water bodies (e.g. Lake Gatun), and prioritized. Specific programs and projects can be developed for the priority sub-watersheds with stakeholders from those areas.

Experience has shown that the most effective approach in urbanizing areas is to work on sub-watersheds of under 50 sq. miles (or 125 km^2). Sub-watersheds which contribute to the highest priority problem in the full watershed are addressed first. The result is a series of sub-watershed plans which, in sum, provide the detail needed for a watershed plan for a larger scale waterway (Chagres River or Lake Gatun).

Consultation and Negotiation with Stakeholders

Participation of local residents and development interests in an effective watershed plan is more than keeping people informed. Government agencies

which attempt to control watershed land use using a "top-down" perspective can face massive non compliance with the plan. The essence of a successful watershed plan is the negotiation of reasonable compromises on land use issues with the private interests who control that land. The planning process must therefore include many opportunities to inform and consult with the general public (this is often in the form of hearings), as well as opportunities to negotiate face-to-face with key private interest groups on critical issues.

Balance between Incentives and Regulations

Watershed plans usually require some stakeholders (e.g., farmers or industrialists) to absorb new costs for improving their management of water resources. Some regulation of contaminant discharge or excessive water use, is inevitable, because purely voluntary programs never reach the least cooperative user. To make the costs of new regulation acceptable, it is common to offer financial incentives for meeting the new standards. This often takes the form of cost-sharing programs (grants or loans) for installing new treatment or management systems-- a major share of many watershed programs' budget. Finding the appropriate balance between regulations and incentives on each issue is part of the art of watershed planning.

Control Land Use Change

Experience in urbanizing areas has shown that degradation of stream channels, water quality and aquatic flora and fauna is inevitable beyond certain levels of development. Various authors have argued that once 15% of a watershed becomes impermeable (paved for roads, parking lots, rooftops), irreversible water quality declines will occur, and further degradation is proportional to development density (Schueler et.al., 1998). This analysis indicates that planners must choose what level of degradation is permissible in various urbanizing sub-watersheds.

In many cases, regulatory controls ("zoning") to limit urban land use density and patterns near waterways will be required to halt the degradation process. Agricultural or forestry land uses can be compatible with high water quality if specific conservation measures are taken. However, these measures usually include setbacks of agricultural or forestry use from waterways, which may remove some land from production. These kinds of land use controls on private property can be extremely difficult to implement. Within this context, it is worthwhile to note that zoning usually implies limitation of *future* development

options, while *reversion* of developed land to other uses (such as proposed in the ARI Regional Plan for the Canal Watershed) is usually not politically feasible.

Measure and Publicize Progress

The enthusiastic involvement of the stakeholders in a watershed plan is obtained by keeping everyone informed of positive developments and progress. A publicity program starts with informing people about the watershed, defining who lives there, then clarifying the specific problems which exist. Monitoring program data should be translated into laymens' terminology so that residents can understand how the water resources in their area are changing. In this respect, "indicators" of water quality or stream health are used which can be easily measured and explained. For example, "the percentage of streams in the watershed which are safe for swimming," or the "number of fish found per 100 meters of stream," are indicators which most people understand.

A Systematic Watershed Planning Process

Systematic and efficient planning is a key to successful watershed management. A suggested first step is to clearly define the purpose of the planning activity. The essence of watershed planning is the process of bringing together diverse stakeholders to craft agreements which guide land use and protect water resources. The plan is not a study, but a series of agreements among the stakeholders on what actions must be taken, by whom, with what funds, and on what schedule in order to meet specific water resource goals. Therefore, the plan is a set of stakeholder agreements to improve their management of the watershed. Other key steps include:

Strategy and Decision-Making Methods: Once the purpose has been defined and agreed upon, the stakeholder groups must be convened and agree to common strategic goals and internal decision-making methods. Emphasis from the beginning should be placed on including all the relevant public and private groups in the process to achieve buy-in and a sense of "ownership" in the watershed management effort.

Identify Concerns: The participants in the planning group need to clearly identify their concerns about water resources, as well as related natural resources, economic and social issues in the watershed. The concerns in the Panama Canal Watershed may include issues like erosion and sedimentation of the reservoirs,

pollution of potable water supplies for Panama and Colon, local public health and sanitation issues, pollution of rivers and reservoirs which could damage fishing or recreation, uncontrolled expansion of urbanizations, impacts of agro-industries, or others. The diverse concerns of various stakeholders should be categorized, but at this stage no concern should be eliminated.

Each category of concerns should be researched, perhaps by a technical group using only existing sources of information at first, to determine the nature and dimension of the problem. It is recommended that exhaustive inventories of natural resources, or the development of complex GIS systems be avoided at this stage, due to their tendency to drain too much energy and resources from the problem definition process. The Panama Canal Watershed has excellent existing information resources from the Proyecto Monitoreo de Cuenca del Canal (PMCC), the ongoing ACP monitoring programs and the ARI reports, among others, available to meet this need.

Prioritize Problems: The stakeholders must establish criteria and prioritize the most critical problems and most promising opportunities for improvement. This is the appropriate time for dividing the Panama Canal Watershed into smaller sub-watersheds in which each has a distinct set of problems. The prioritization of problems at the sub-watershed level should clearly reflect the major issues which have been identified for the whole Watershed. For example, if nutrients in Lake Gatun is a major watershed issue, in each sub-watershed the type, amount, and source of nutrients should be analyzed to see if that sub-watershed is an important contributor to the large-scale issue.

Establish Water Resource Objectives: The group should establish specific, quantifiable objectives which focus on the state of the water resource, not on the programs of the agencies. It is important to reach clear agreements, preferably a consensus, with key stakeholders on the specific objectives of the plan. For example, if a goal of the plan is to maintain high quality water for recreation and potable water in the Chagres River, a specific objective may be to "maintain fecal coliform bacteria levels in the Chagres below international standards for recreation." Numeric targets are then set for specific seasons and locations. Objectives which focus on activities, like "monthly bacteria monitoring," instead of the state of the water body, are to be avoided.

Design Monitoring Program: The watershed plan must have a scientific monitoring component to determine how well the program is progressing in

meeting its objectives. For example, monitoring may report that "fecal coliform levels in the Chagres River have increased 25% in the last three years, but remain below the target level." This lets the watershed group know the status of the problem (it's still getting worse), and the status of the water resource (it's still meeting the standard). Good water resource scientists must be available for designing a monitoring program and interpreting results.

Establish an Action Plan: Actions to accomplish the specific objectives are the heart of watershed plan. The plan may include actions such as studies to clarify certain problems, development of regulatory or legislative initiatives, and the implementation of a variety of projects to improve sanitation and natural resource management in the industrial, urban and agricultural sectors. For example, if one of the objectives is to control nutrient pollution in the Lake Gatun, management actions might include a study of the lake's vulnerability to algae blooms and eutrophication, an inventory of the sources of nutrients in the Watershed (best done at a sub-watershed level), development of regulations controlling these nutrient discharges and financing projects to reduce the nutrient content of wastes, or to divert them from waterways.

It is important to realize that there are many alternative actions which could help accomplish any given water resource objective. These alternatives must be realistically evaluated. An important factor in choosing among the alternatives is consensus among the stakeholders. Otherwise the watershed plan's management actions will fail.

Implement and Evaluate Progress: Once the action plan, usually a multi-year plan, is developed and implementation is underway, the Watershed authority (the CICH), must continue to review and evaluate the success of each major action and compare the progress expected to the results of the monitoring program. Each sub-watershed plan will be a major action within the overall action plan, and can be evaluated separately, and as part of the whole. In the end, if the quality or quantity of water doesn't improve or if water resource degradation is not averted, the watershed management plan has not been successful. On the other hand, one can say that *a successful watershed management program integrates the concerns of diverse stakeholders into a set of concrete management actions, and the positive results of those actions can be scientifically measured in the quality or quantity of water.*

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Appendix 3

CICH Role And Functions

Executive Summary

On January 1, 2000, with its assumption of the control of the administration of the Panama Canal from the Government of the United States, the Government of the Republic of Panama began to forge the needed national institutional, legal and regulatory frameworks to ensure the Canal's continuous efficient and effective operation.

The Canal needs an assured water supply. The Canal's water source is the Panama Canal Watershed, an area of more than half million hectares, which includes land, lakes, rivers and reservoirs. The Watershed also supplies the drinking water to the nation's major metropolitan centers.

This document traces the legal and historical antecedents leading up to the formation of the Inter-Institutional Commission (CICH), on March 15, 2000. The CICH is a Panamanian government entity entrusted with the responsibility of the maintenance, protection and utilization of the Watershed's water resources through the coordination of the activities of the public and private sector entities which could affect the Watershed, in general, and its water resources, in particular.

Based on the existing legal precedents, a possible institutional modality for the Commission is proposed in this document. The discussion describes those components, which are essential for the fulfill of the Commission's mandate, such as a Permanent Secretariat and an Environmental Information Center, as well as other components, which could become part of the Commission as it continues to mature.

Several difficult issues concerning the management of the water resources of the Watershed are raised in the penultimate chapter of this document, including:

- potentially conflicting or overlapping institutional jurisdictions;

- relative desirability of alternative coordinating instruments;
- the appropriateness of certain appellate and conflict resolution processes, and;
- the importance of comprehensive stake-holder representation and participation in the CICH.

The document's final chapter offers a guide for the formulation of internal operating procedures or guidelines for the CICH. These guidelines attempt to ensure the highest degree of collaboration among the Commission members and, consistent with the existing legal framework, accords the Commission the autonomy and authority, flexibility, and financial security required to fulfill its mandate.

Historical Background and Chronology

In 1994, the National Constitution of Panama created the Panama Canal Authority (*Autoridad del Canal de Panamá*, ACP) to administer the Panama Canal, regarded as an "inalienable national asset" (*un patrimonio inalienable de la Nación*).

On June 11, 1997, Law 19, in establishing the ACP's legal and institutional framework, authorized, *inter alia*, an inter-institutional commission (*Comisión Inter-Institucional de la Cuenca Hidrográfica*, CICH) with the support of the ACP to coordinate entities involved in activities, affecting the Watershed's water resources.

Two years later, on June 17, 1999, the ACP's Board of Directors approved *Acuerdo 16* which set forth the "Regulations Concerning the Environment, Canal Watershed and the Inter-Institutional Commission for the Canal Watershed" ("Regulations"), laying out the Commission's basic functions and administrative structure.

In accordance with the 1977 Canal Treaties, dealing with the transference of the Panama Canal by the Government of the United States to the Republic of Panama, on December 31, 1999, the Republic of Panama assumed full responsibility for the administration, operation and maintenance of the Panama Canal. On that date, the ACP became the sole administrator of the Panama Canal.

The CICH was officially inaugurated by the ACP on March 15, 2000.

Legal Precedents and Justifications

The National Constitution

The Panama Canal is the world's only waterway protected under a national Constitution. Chapter 14, Article 309 of the Constitution[32] of the Republic of Panama confers to this waterway, along with its associated infrastructure and watershed, special prerogatives and protections to ensure the Canal's efficient and uninterrupted operation.

The Panama Canal Authority (*Autoridad del Canal de Panamá*, ACP), an autonomous public entity, was created by the Constitution in Title 14 (and further elaborated in Law 19 of June 11, 1997, see below), to manage the Canal. The ACP is headed by an eleven (11) member Board of Directors, including a ministerial-ranking Director, the Minister of State of Canal Affairs, named by the President; who presides over the other ten (10) members of the ACP Board of Directors. Their terms are for nine years. The Board of Directors nominates the Administrator of the Panama Canal for a term of seven years. The Administrator is responsible for the Canal's actual management and operation.

The Canal operation requires abundant supplies of water, nearly two billion gallons every day. The Panama Canal Watershed (PCW), covering an area of more than half million hectares (ha), supplies this water[33]. The PCW consists of the water of the lakes and tributaries in the Watershed. The Constitution (Article 310) requires that the ACP, in coordination with the relevant national organisms, have exclusive responsibility over the: administration; maintenance; and use and conservation of the PCW water resources.

With respect to development along the banks of the Canal, the ACP has extraordinary authorities. The National Constitution requires that explicit, formal

[32] Constitución Política de 1972, Tercera Edición, March 1999, Title 14 added through Art 1 of the Legislative Act of December 27, 1993 (G.O. 22.674 of December 1, 1994).

[33] Law 44 of August 31, 1999, establishes the actual boundaries of the Panama Canal Watershed. Under the Law 44, the General Assembly passed the Cabinet of Ministers recommendation to approve the ACP Board of Directors proposal to expand the area of the Watershed to encompass more than half million ha. The Watershed includes all the land and waters within the prescribed area.

and prior ACP approval be given for any of the following to be authorized to proceed: construction plans; water use; use, expansion and development of ports; and any other work or construction.

Law of the Panama Canal Authority

Law 19 of June 11, 1997 established that, on December 31, 1999, at the transfer of the Canal by the Government of the United States to the Government of Panama (GOP), the ACP would succeed the Panama Canal Commission as the responsible entity for the management and operation of the Canal.

Law 19, Article 6 reiterates the ACP Constitutional mandate to be responsible for the administration, maintenance, use and conservation of the water resources of the PCW, defining the Watershed as "the geographic area whose waters, surface and underground, flow to the canal or empty into the canal through the lagoons and lakes".

According to Law 19, to carry out these Constitutional functions, the Authority would: (1) coordinate, with governmental and non-governmental organizations (*organizaciones no-gubermentales*, ONGs), specialized in the subject, with responsibilities and interests in the natural resources in the PCW, in the administration, conservation and use of the natural resources of the Watershed; and (2) approve strategies, policies, programs and projects, private and public which could affect the Watershed.

Further, articles 6 and 18 (5.b) of Law 19 direct the ACP Board of Directors to establish and prepare by-laws for an inter-institutional commission (*Comisión Inter-Institucional de la Cuenca Hidrográfica*, CICH) to coordinate the activities of government entities and the ONGs involved in the PCW. Article 6 requires that the ACP coordinate, in conjunction with the relevant entities, the administration, conservation and use of the natural resources of the PCW. The law, by providing no further stipulations nor limitations concerning the CICH's composition, operation or financing, grants a great deal of latitude to the best way to organize the Commission.

Acuerdo 16

On June 17, 1999, in *Acuerdo* 16, the ACP's Board of Directors approved the Regulations ("Regulations") concerning the ACP's institutional responsibilities

with respect to the environmental protection of the Watershed, including the framework for the CICH's functions and structure.

Art. 7 of the Regulations identifies the ACP's responsibilities in environmental matters within the Watershed, as the following:

1. to review the environmental impact studies of activities which could affect the environment;
2. to authorize formally projects which could affect the environment;
3. to monitor that projects fulfill the legal and regulatory requirements and do not affect the environment negatively;
4. to establish obligatory programs of emission, effluent and disposal control to avoid or mitigate negative environmental impacts;
5. to promote and support economically efficient programs and projects which reuse and recycle materials and reduce waste, and develop alternative uses of waste and use of clean technologies; and
6. to request the responsible entities to submit the environmental impact studies for projects within the Watershed to the ACP for its evaluation.

To enforce its mandate, Chapter III (Art. 14-16) of the Regulations states that the ACP is legally empowered for the following:

1. to inspect the conditions of the natural resources through the program of supervision and monitoring, developed in cooperation with the competent institutions;
2. to request from the responsible entities the submission of the environmental impact studies for their evaluation and approval by the Authority; and
3. to cancel or suspend permission and request the competent authorities to withdraw the authorization for projects which fail to comply with environmental requirements.

To support its mandate, the Regulations (Chapter VI Art. 38) create the CICH, a Commission to coordinate the activities, initiatives and resources for the conservation and the management of the PCW and to promote the sustainable use of the water resources.

As authorized by Law 19, the Board of Directors provides in Chapter VI Art 39-43 of the Regulations preliminary guidelines for the establishment of the CICH. Accordingly, the Commission would be presided over by the ACP's

Administrator and composed of seven (7) high ranking Commissioners. Art. 39 identifies the following as members of the CICH:

1. Minister of Government and Justice (*Ministerio de Gobierno y Justicia)*, in its capacity to enforce compliance with the legal requirements and security matters;
2. Minister of Housing (*Ministerio de Vivienda, MIVI*), in its capacity to formulate policies and programs related to residential developments and population settlements within the Watershed;
3. Minister of Agricultural Development (*Ministerio de Desarrollo Agropecuario, MIDA*), in its capacity to formulate policies and implement programs and projects related to the agricultural and rural development of the Watershed, including productive farming, agro-forestry and eco-tourism;
4. National Environmental Authority *(Autoridad Nacional del Ambiente, ANAM),* in its capacity to formulate policies related to the protection and use of natural resources in the country, as well as its capacity as the focal point of the national environmental impact studies process for project proposals having potential significant environmental impacts;
5. Authority for the Inter-Oceanic Region *(Autoridad de la Región Interoceánica, ARI)* in its capacity as the responsible entity for the land use of the lands transferred from the USG to the GOP; and
6. Two representatives of non-governmental organizations with interests in the Watershed, in their capacity to represent the local communities and interests of the Watershed[34].

Further, Article 40 delineates the following functions for the Commission:

1. to establish a coordinating mechanism among the organizations having activities in the Watershed;
2. to establish, under the Authority's coordination and direction, a mechanism or system of finance and administration of the economic resources for the operation of the Commission and projects authorized by the Commission;
3. to supervise programs, projects and policies necessary for the adequate management of the Watershed and to ensure that the potential negative impacts are minimized;

[34] On March 15, 2000, the Administrator of the ACP nominated the following two NGO's for the CICH: Fundación NATURA and Cáritas Arquidiocesana.

4. to evaluate the programs, projects and policies, in the planning phase or already existing, in the Watershed to resolve possible contradictions or duplications; and
5. to establish an environmental information center for the Watershed which will include, among other things, collect and update an information base on projects and programs in the Watershed.

Article 41 requires that relevant entities, responsible for the supervision of projects being implemented in the Watershed, provide to the Commission periodic progress reports concerning the projects, especially with respect to their environmental impacts. In addition, each commissioner would assign a representative to follow the implementation of programs, projects and activities falling within the domain of the mandate of the Commission.

Article 42 makes reference to the financial arrangements of the Commission. Under the Regulations the CICH could request and obtain, through the ACP, technical and financial support and cooperation from national and international organizations in the preparation and development of projects.

Principal Functions of the ACP and Role of the CICH

The CICH is to assist the ACP carry out its responsibilities over the administration, maintenance and use and conservation of the water resources of the Watershed. In this area, the ACP has the following three principal functions:

1. to administer, conserve and maintain the water resources for the operation of the canal and the supply of potable water for the neighboring populations, and to promote the rational and sustainable use of the water resources;
2. to coordinate the conservation of the natural resources of the Watershed with the relevant public and private entities; and,
3. to approve the strategies, policies, programs and projects, public and private which could affect the Watershed.

It is to these ends that the CICH is to coordinate, with governmental entities and non-governmental organizations, specialized in the subject, with responsibilities and interests in the natural resources in the PCW. Below the three principal ACP mandates are discussed with respect to the role the CICH would play in the fulfillment of each and an identification of the legislative, administrative or regulatory measures required for the CICH to carry out its role.

1. Administer, conserve and maintain the ***water resources*** for the operation of the canal and the supply of potable water for the neighboring populations, and to promote the sustainable use of the water resources;

Instrumentality. The ACP is conferred the role of the official advocate and guardian of the Watershed's water resources. To be in a position to protect such resources, the ACP needs to be able to monitor developments in the Watershed and interpret the potential effect on the water resources of the PCW.

To this end, the CICH could:

- Maintain a comprehensive data base covering environmental data, as well as information regarding developments in the Watershed; as well as provide a forum for agencies to discuss developments and plans in the Watershed; and

- receive and review environmental impact evaluations from the relevant agencies to be submitted to the Board of Directors for its final approval.

Requirement. The internal operating procedures of the CICH could provide for the establishment of and the terms of reference for the Environmental Information Center. In addition, a series of memoranda of understanding could be agreed upon between the CICH and other entities, such as ANAM, IDAAN, MIDA, Maritime Authority of Panama (AMP), Ministry of Health, among others, to specify the information required and ensure the timely and compatible transference of data to the CICH Environmental Information Center.

2. ***Coordinate*** the conservation of the natural resources of the Watershed with the relevant public and private entities.

Instrumentality: The need to coordinate the activities of the various entities in the area of natural resource conservation is essential to ensure the that the natural resources of the PCW are protected in the most effective and efficient manner. To this end, the CICH could:

- convene regular meetings to discuss developments in the Watershed which could affect the natural resources;

- develop a network of ad-hoc technical committees;

- provide a forum for local communities concerned with developments which directly affect the PCW; and

- support Special Studies and programs, as warranted to provide coordination and further investigation on relevant issues to water resources management.

Requirement. The internal operating procedures of the CICH could:

- authorize the convocation of regular and extraordinary meetings;

- specify the conditions and the general terms of reference for the establishment of ad-hoc technical committees;

- specify the conditions for use of the CICH as a forum for local communities;

- authorize the establishment of and the terms of reference for a Permanent Secretariat to service the needs of the CICH;

- authorize the CICH to propose to the Administrator of the ACP issues which warrant being covered under the Special Studies program;

- authorize the CICH to support and collaborate with environmental outreach programs;

- authorize the CICH to enter into memoranda of understanding with other entities to facilitate the exchange of information; and

3. ***Approve*** the strategies, policies, programs and projects, public and private which could affect the Watershed.

Instrumentality: The Board of Directors would need to have that proposed private and public strategies, policies, programs and projects affecting the Watershed be presented to it for its review, evaluation and approval.

The CICH could facilitate this process by requiring that all private and public investments, projects, programs and plans which would take place in the PCW or could affect the water resources of the PCW, and have been provisionally approved by ANAM, be presented to the CICH for its review, and for final approval of the Board of Directors of the ACP.

Only those projects which have received the final approval of the ACP Board of Directors may proceed. The CICH would convey the decision of the Board to the relevant authorities.

Requirement. An arrangement between ACP and relevant entities, ANAM, in particular, would be necessary to ensure that the project proposal would be submitted to the CICH in a timely fashion. This arrangement could be reached through a memorandum of understanding between the two entities.

In fact, the CICH by providing a "one-stop window" for potential developments in the Watershed, can streamline the approval process and introduce efficiencies that enhance its role as a "service" organization.

Institutional Modalities

Selection Criteria

To accomplish its complex and demanding mandate, CICH requires greater definition. In the determination of an appropriate institutional modality for the CICH, it is important to bear in mind the following criteria:

Consistency with the CICH's mandate; Does the modality ensure the efficient operation of the Canal by coordinating, with governmental and non-governmental organizations specialized in the subject, with responsibilities and interests in the natural resources in the PCW, in the administration, conservation and use of the natural resources of the Watershed?

Conformity with the National Constitutional and legal framework; Is the modality consistent with the National Constitution and other national laws, especially those related to prerogatives and responsibilities of the residents of the Watershed, and other national and local entities which are involved in natural resources protection, water resource utilization, land use, health and sanitation and maritime affairs?

Consistency with international treaties and obligations; Is the modality consistent with international obligations of the GOP, especially with respect to the management of natural resources and navigation?

Technical competency; Does this modality ensure that the members of the Commission will be technically qualified to carry our their mandate?

Administrative Efficiency; Does the modality represent the most efficient means of accomplishing the objective? Does the modality avoid unnecessary duplication of bureaucratic processes?

Financially sustainable; Does this modality ensure that the Commission will be able to continue its operations for the medium to longer term? Would the source and level of financing ensure sufficient technical competence to promote the smooth operation of the Canal?

In summary, to date, consistent with the Regulations, the CICH is:

- an organization which is subject to coordination and direction by the ACP;
- presided over by the Administrator of the ACP;
- composed of eight members, six of which are ministers of administrators of public entities and two members are NGO representatives.

Building upon these essentials, the modality selected should be such that the CICH would be an entity competent:

- to establish administrative and financial frameworks and arrangements to support the operations of the CICH and any special projects;
- to establish a coordinating mechanism among the relevant institutions;
- to supervise existing, and evaluate proposed, programs and projects related to water resources of the Watershed; and
- to establish an information center.

Essential Components

The CICH would require, at a minimum, a Permanent Secretariat and an Environmental Information Center to carry-out its mandate as specified in the Regulations. ACP funds could finance the initial costs of operation.

To carry-out its mandate, the secretariat of the CICH would consist of a(n):

- Executive Secretary
- Administrative Assistant
- Data Management Specialist
- Project Officer
- Financial Officer
- Secretary

The secretariat would:

- service CICH meetings;
- establish effective coordinating mechanisms with the member entities of the CICH;
- consolidate necessary documentation, especially environmental impact evaluation, for review and approval by the Board of Directors;
- facilitate the exchange of information among the various entities, especially with respect to the operation of the Environmental Information Center;
- establish, maintain and update the Environmental Information Center, as well as disseminate the information in the form of periodic reports and special reports, as needed;
- prepare its budget and that of the Environmental Information Center for consideration of the CICH, and
- facilitate stakeholder input into the CICH decision-making process through coordination of regional councils, technical committees or other mechanisms.

Additional Components

Special Projects

In addition, as stated in *the Regulations*, the CICH could become involved in special projects. These projects could address formulation of policy options, in areas related to water resources, such as research on the effects of water pollution, the price elasticity of demand related to clean water users' fees, and solid waste management. Special Projects could be executed in conjunction with other entities and could be supported through various funding sources, including multi- and bi-lateral donors, foundations and others.

To administer and manage such Special Projects it could be useful to establish within the CICH a small unit exclusively dedicated to this area.

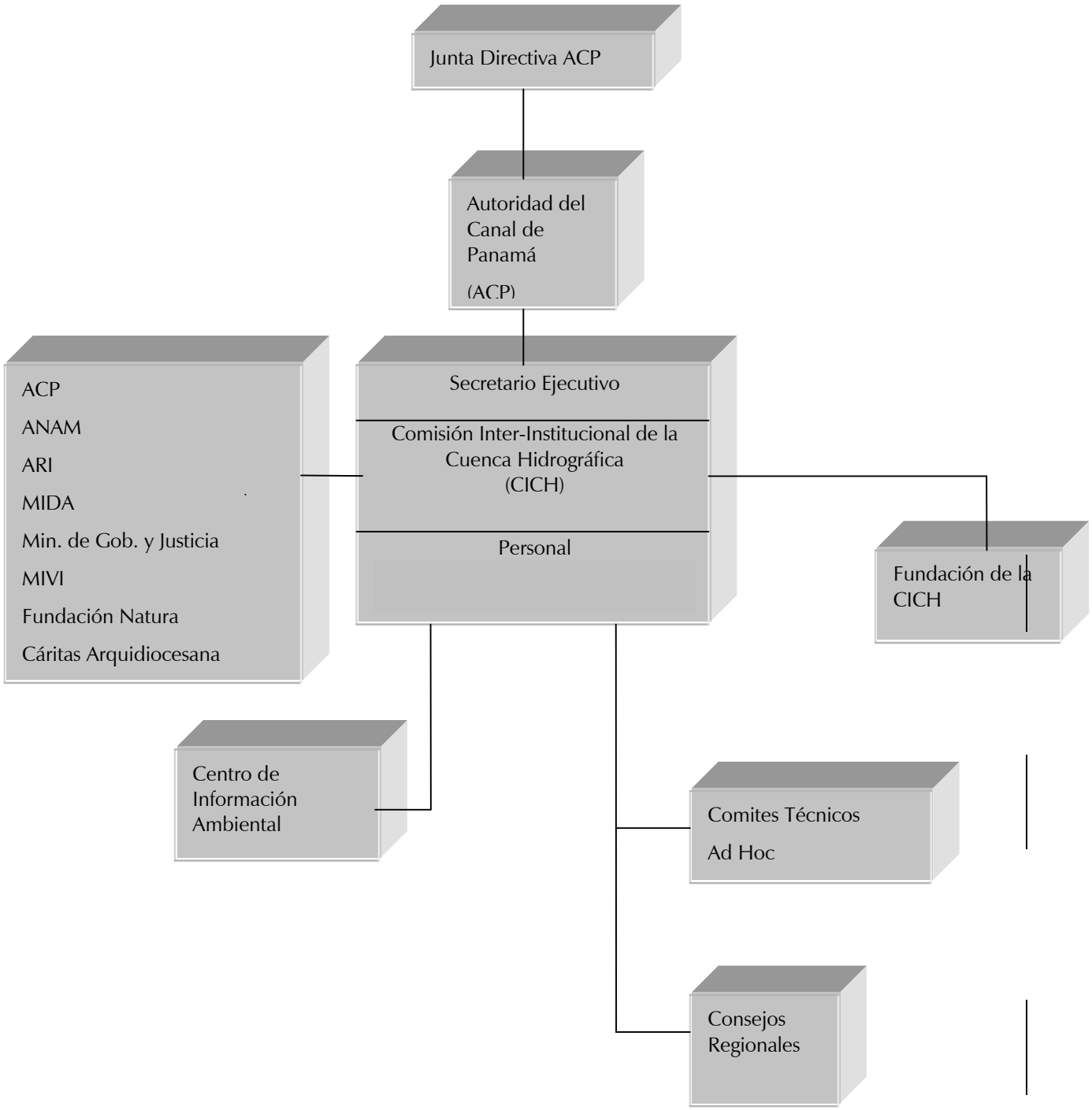
Environmental Outreach Program

Education of the value of natural resources is an important tool in the protection of such resources. As such, the CICH should work with entities involved in the implementation of environmental education programs for residents, school children, commercial users, and private and public developers of the Watershed. Over time the coordinating role of the CICH could become substantial in this area and it could be advisable to consider establishing a separate environmental education outreach unit within the CICH.

Endowment Fund

While the ACP funds will support the operation of the Secretariat and the Environmental Information Center initially, the CICH will need to identify alternative funding sources for many of its other activities. A trust fund, in favor of the CICH activities, could be created as a private Foundation. Funds to establish the endowment could be sought among the multi-lateral donors and foundations which support environmental/natural resources management activities (for details see "Preliminary Financial Plan for the CICH").

Figure 1 Proposed Organizational Structure of the CICH



Role of the CICH in Regulating Activities in the PCW

Summary of Regulatory and Enforcement Needs

There are a number of legal and policy challenges associated with management of the PCW. These challenges for rational application of regulations and enforcement procedures include: (1) the specific roles of CICH and member institutions are not fully defined; (2) representation of the private commercial sector on the Commission is not defined, and could become relevant with respect to many management issues; (3) provisions for environmental exceptions or variances, and waivers are not clear in the law; and (4) there are many areas where there appear to be either overlapping jurisdiction or a lack of clear and detailed authority. None of these challenges is insurmountable, but they do argue for the need for in-depth policy dialogue among CICH partners, at an early stage in operations.

Legal means for enforcing compliance with environmental protection needs have long been difficult to apply in Panama (see Appendix 6). Even though tough sanctions have been technically available under existing law, in practice, real remedies were seldom achieved. One response to this has been the enactment of a series of laws during the 1990's, which has served to strengthen the bases through which compliance may be obtained. These initiatives are closely tied to the needs of watershed management for the canal area.

Proposed Regulatory and Enforcement Mechanisms

Based on the proposed operational structure of the CICH, which remains rather broadly defined, several regulatory mechanisms are suggested for consideration. It is likely that, as the GOP moves ahead in establishing the CICH as its primary vehicle for managing the PCW, more and more situations will arise in which the CICH intervenes in the application of regulations and enforcement actions may be necessary. While an initial effort at a policy dialogue, and execution of Inter-Agency Agreements can serve to set the basic guidelines for these actions, this is a dynamic process, and one that time and case-by-case considerations will modify. It is also likely that in the near term, while the CICH goes through its early institutional growth, the responsibility for application of these systems will continue to reside with ANAM and other agencies whose mandates in these areas

are relatively clear. Indeed, the CICH role may never be more than that of an agent, a coordinator, or a claimant in these cases.

Environmental Permitting

If meaningful management of the Watershed is to occur, means of controlling on-going and proposed activities that might have environmental impacts must be established. According to existing law, this control would reside in the CICH, either directly, or indirectly through access to remedies via other participating agencies such as ANAM in most cases. One means of organizing control over human interventions in the Watershed is to set up a system of permits for various categories of activity, a permit being granted by (or through) the CICH after the applicant meets a series of environmental and/or other requirements. The overall strategy adopted by the CICH for achieving compliance should examine a range of mechanisms, for which consideration will be required in negotiating and executing Inter-Agency Agreements among participating agencies

Licensing and Fee Systems

The use of licenses and fees provides means to apply a permit system, to control particular kinds of resource use on a periodic basis, and to generate income to help cover management and monitoring costs. Licensing is often used for harvesting or extraction activities associated with common property resources, including timber cutting, hunting, fishing, grazing, and sometimes mining. Since these all may represent resource transfers, there is strong rationale for charging user fees. Also, since conditions external to the system can bring about unforeseen changes in renewable (or non-renewable) resource stocks, it is also rational for resource managers to retain the capacity either to renew or to cancel the license, consistent with perceived management objectives.

The effective application of a series of licensing strategies depends on the availability of management information. For example, it is a known practice in fisheries management to construct “bio-economic” models of a fishery upon which various management tools can be tested in order to establish a licensing

strategy that will maintain the resource while capturing for resource owners the real value of the harvest, through appropriate license fees.[35]

Enforcement

Compliance with regulatory objectives may be achieved in many ways. It may be possible to effect certain kinds of compliance through efforts that simply inform people of a preferred way to do something, or that change public or user attitudes, such as promotional campaigns, environmental education efforts, and training or team building initiatives. Incentives can be a powerful, positive (or negative) force for change, as well. In some cases, however, achieving the desired changes among certain resource users requires the application of fines and/or other punitive remedies.

Education and Training

Environmental education (EE) programs represent a potentially very effective and positive means of changing public awareness and attitudes, and even of developing and expanding interest in improved natural resources management issues. Since environmental education, particularly in the area of public awareness campaigns, offers such an important avenue for improving public compliance with natural resources regulations and policies, it should be considered carefully by the CICH.

Incentives

Another powerful means of achieving change in regulatory compliance is the use of incentives. Examples of the efficacy of this tool abound. In Panama the tax incentive associated with conversion of range land to agro-forestry plantations is well known, and its impact visible to any visitor to the PCW. The CICH should examine the possible role of incentives, and consider a variety of possible applications. The use of tax "breaks" or fee/fine reductions in return for desired

[35] To be effective, such analyses require constant updating and adaptation. This is the kind of analytical capacity that should be created eventually within or allied with the CICH. This could become one of the roles of the Environmental Information Center. Data would derive from many sources, including CICH activities in evaluation and oversight. Analytical services based on these data would be of use not only to managers, policy makers, and regulators of the CICH, but to other public and private sector users and planners as well, some of which would be expected to be paying customers.

resource management performance, for example, should be part of the "toolbox" employed in the PCW.

Fines and Other Penalties

There will unfortunately be cases whereby regulation, education, and/or incentives will not have made the desired impression on specific resource users in the Watershed. CICH must have at its disposal mechanisms whereby remedies may be applied in these cases – either through a capacity to levy fines or other penalties directly, with the force of law behind it; or through immediate access to other agencies with jurisdiction and authority to act in the case at hand. It is very likely that the application of these sorts of enforcement tools by or through the CICH will occur only after a process of policy dialogue and formulation has resulted in the generation and execution of enabling Inter-Agency Agreements between the ACP and the appropriate authority.

Role of the CICH

Organization of inter-related roles in the regulatory and enforcement functions involved in the CICH appears complex, but should be simplified as consensus building and the negotiation of agreements proceeds. Under a management strategy giving the CICH primarily monitoring, coordinating, and advisory responsibilities (without an implementation role), CICH staff would set up operational procedures through which on-going and proposed activities within the Watershed would be monitored, and through which the various approvals, permits, or licenses could be facilitated; through the inter-institutional linkages of the CICH. CICH participation for new projects should begin in the planning phase, and CICH technical staff could assist project designers in compliance matters at an early stage, resulting in substantial savings of time and effort at the approval stage.

The CICH should be seen, and should function as a "broker" or a clearinghouse for meeting PCW resource use requirements, and absolutely not as one more step in a bureaucratic process. It is essential that this distinction be made, cooperating with CICH should save a developer time and trouble, not cost it more. Where necessary, and stipulated in Inter-Agency Agreements, the CICH would communicate with and cooperate with its member institutions in the planning, oversight, and compliance phases of development project execution within the Watershed, offering a "one-stop window approach" to developers.

In appropriate situations, CICH staff could provide or arrange for short term training to stakeholders on compliance matters, and could coordinate EE programs in response to identified needs. The data storage and processing capacity of the CICH should be highly developed, in order to back up licensing decisions, provide other users and partners with useful information, and serve the needs of the EE and training programs.

Issues

Role of the ACP in the Watershed

The ACP's legal role in matters related to the water resources of the Panama Canal Watershed is firmly established by the National Constitution and further elaborated specifically in Law 19. Nevertheless, the distinction between the mandates of the ACP and those of other institutions, in particular, ANAM, in matters of environmental protection; ARI, in issues of land use in the Watershed; and the AMP, with respect to the waterways, are, at best, unclear, and, at worst, contradictory.

In Napoleonic law, legal scholars maintain that:

1. Constitutional mandates always take precedence over legislative mandates; and,
2. The more specific law takes precedence over the more generalized law.

Of the entities involved in the Watershed, the ACP is the only entity involved in the Watershed with: (1) Constitutional guarantees, and (2) a specific law defining its responsibilities and functions specifically within the Watershed. Legally, the preeminence of the ACP is indisputable.

Nevertheless, the ACP is not precluded from compliance with existing laws and regulations. For example, all proposed developments, projects and programs of the ACP in the Watershed would be subject to the same scrutiny by ANAM as any other development and would need to proceed with the Environmental Impact Evaluation process. Further, as nearly half of the Watershed is protected or park area, the ACP would need to respect the regulations associated with such areas. Similarly, in the absence of an explicit ARI - ACP understanding exempting the ACP to all or some of the provisions of the land use provision, the ACP would

need to respect the zoning regulations of the land use as identified in the Regional Plan (Law 21, 1997).

Coordinating Instruments

The mandate of the CICH is comprehensive and complex, involving many public and private, technical, commercial and social entities. As such the Commission will need to establish a relationship with each.

An umbrella piece of legislation, embodying all entities involved in the Watershed would be one instrument available to formally define these institutional relationships. This instrument would have the obvious advantage of then carrying the force of law in questions of compliance and enforcement. However, the legal instrument would also reduce a degree of flexibility in these relationships, restricting the actors' ability to respond quickly to changing circumstances. In addition, the ratification process for such a complex piece of legislation would be costly and time consuming. It could easily require more than three years before a law could be approved and agreement could be reached on regulations.

A written agreement between the parties can be a preferable instrument to define the institutional relationship. This may be either a multilateral document signed by all members of the CICH or a series of bi-lateral Inter-Agency Agreements between the CICH and individual entities. Such understandings should be drafted early when the spirit of institutional cooperation is strongest. Frequently, having such written understandings in place prevents institutional tensions from developing. Should disagreements arise, the understandings facilitate a rapid resolution.

Instruments, such as the Inter-Agency Agreements and the agreement of technical cooperation, are used frequently by the public entities of the Panamanian Government. These instruments are respected. It is common practice to establish institutional relationships without having to submit to the burdensome process of legislative ratification by means of such instruments.

Conflict Resolution and Appellate Process

No matter how well an Inter-Agency Agreement may be designed or how strong may be the spirit of institutional cooperation, conflicts between institutions,

private and public, will arise in areas as delicate as the appropriate utilization, use and conservation of water resources in the Watershed.

On those occasions, the CICH will need to be able to recommend to the ACP Board of Directors actions to be taken. Should a discrepancy involve public entities of equivalent stature, the CICH could recommend that the dispute be presented before the *Procuradora de la Nación* for resolution. Should the parties wish to appeal the decision, the issue could be taken before the *Tercera Sala* of the Supreme Court for final resolution.

Stakeholder Representation

The CICH will be providing an unique and indispensable role in the protection of the water resources of the Watershed by establishing itself as the forum in which all stake holders, all entities interested or involved in the protection of the Watershed, can participate. Should the CICH become nothing more than a series of meetings between mid-level government bureaucrats intent upon preserving their institutional areas of responsibility, the CICH will be ineffectual and a waste of time and money. It is important, therefore, that the internal operating procedures of the CICH be flexible. In addition, the CICH procedures should allow for the eventual inclusion of other parties as members upon approval by the ACP, and for the participation of other parties in the CICH sessions.

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Appendix 4

Preliminary Financial Plan For The CICH

Executive Summary

The Inter-Institutional Commission for the Canal Watershed (CICH) has been created to coordinate protection and management of the Watershed. The CICH's enabling legislation, and subsequent implementing regulations, state that, inter alia, the Commission should be a financially self-sustaining entity. This document begins to set the course for financial self-sufficiency through development of a preliminary financial plan for the CICH.

This document identifies the CICH's strengths (e.g., propitious moment in history, legal mandate, ACP resources and support) and weaknesses (e.g., absence of a "track record", exclusion of the private sector). It also reviews the major threats (e.g., potentials for internal disagreement, delegation of representation to a bureaucratic level below that needed for "decision-making") to its success.

The Plan considers the Commission's "products and services" and defines them as CICH functions. It proposes that these functions be decided upon in the context of two Scenarios for the Commission's scope of activity: (1) a Base Scenario in which the CICH undertakes only the essential functions of its mandate; and (2) an Enhanced Scenario according to which the CICH would play a broader role in Panama Canal Watershed (PCW) management.

This Plan provides initial strategies for the Commission's financial sustainability. It argues that such sustainability requires that the CICH be "sized" properly (that it not be overstaffed nor become overly bureaucratic nor overly costly to maintain). It also points out that to achieve financial self-sufficiency the CICH, in close cooperation with the ACP, must embark on an aggressive fund raising campaign. This effort should pursue a wide range of revenue generation possibilities (e.g., budget transfers, donor assistance, endowments, debt for nature swaps, fee-for-service mechanisms, and assumption of equity positions in "green" investments) in fashioning a "model" specific to satisfying its financial needs. This preliminary financial plan supports an efficient financial management system as a critical ingredient for achieving financial self-sufficiency. By using the

ACP's proven financial management processes and procedures, the CICH will have an effective, efficient system to account for its resources.

Overview

Background

In 1997, the Panamanian Congress, through passage of Law 19, created the Inter-Institutional Commission for the Canal Watershed (CICH). The expressed purpose for the creation of the Commission was recognition by Panamanian authorities of the need for a mechanism to coordinate activity to protect and manage the Watershed of the Canal and adjacent major metropolitan areas—Panama City and Colon. Subsequent regulations defined the CICH's role and specified that it would receive institutional and financial support from, inter alia, the Panama Canal Authority (ACP).

Vision

A working definition of the CICH's vision is to support Government of Panama efforts to assure that the Panama Canal Watershed (PCW) is protected and maintained in such a way that it furnishes sufficient quantities of water to assure the inter-oceanic passage of ships thereby guarding the economic importance of the canal to the country. Simultaneously, the Canal Watershed must be managed to supply water of acceptable quality for human use (drinking water, recreation, and waste disposal), provide for energy (hydro-power) generation, and conserve the rich biodiversity and esthetic value of the basin.

Objective

The CICH's objective is to coordinate efforts, initiatives, and resources to conserve and manage the water resources of the Canal Watershed and promote its sustainable economic development.

Keys To Success

To ensure the achievement of the proposed objectives, the following keys to success must be in place:

- Active participation of executive level officials of CICH member organizations in the formulation, implementation and monitoring of programs.
- Clear definition of members' responsibilities and duties by the CICH proper and the ACP.
- Autonomy to operate without political influence.
- Provision of financing for CICH operational and programmatic expenses from a variety of sources so that the Commission becomes financially self-sufficient.
- Incorporation of the for-profit private sector into the CICH.
- Harmonization of the various laws governing Canal Watershed Management.
- Entrepreneurial leadership on the part of the CICH Secretariat.
- Interaction with residents of the Watershed through their local government representatives or community leaders.

Strengths, Weakness, Opportunities, Threats (SWOT) Analysis

The CICH will be challenged to generate the financial resources required to ensure its own long term survival as well as the sustainability of the Watershed proper. There is stiff competition in the international development arena among a very large number of "development-mission" entities for scarce resources. To succeed the CICH must work effectively to secure the resources, to carry out its mission. The CICH has a number of strengths that will facilitate this task but it also has weaknesses that must be taken into account.

As is evident in the following table, the CICH has a number of significant potential strengths, that must be capitalized on to assure the Commission's success. Principal among the strengths is the opportune moment in history as context for the Commission's creation. Its founding coincides with the transfer of the Canal to the Republic of Panama—an act that has given the Canal, the Watershed, and by extension the CICH, unprecedented national and international profile. The CICH can capitalize on this notoriety to leverage the support, financial and otherwise, it needs to carry out its mission. The Commission enjoys the participation of most of the key entities actively working in the Watershed. Finally, the CICH has the financial backing of the ACP to insure a solid start-up.

The Commission also suffers from a number of notable weaknesses. It is a new organization; as such it has neither "track record" nor operational experience. As a start-up organization, it will be subject to a steep "learning curve". CICH members must quickly absorb significant amounts of data to make informed judgements on a range of issues critical to managing the PCW. This will require close cooperation among CICH participants so that the strengths and contributions of each one can be fully utilized. It also must guard against member organizations delegating participation to levels below that of decision-making authority. Such an occurrence could reduce the Commission to a "powerless forum" thereby tarnishing its effectiveness and credibility.

The CICH likewise suffers from not having been constituted as a legal entity. This fact could place limitations on its range of operation – most notably inability to raise money independently for its own financial self-sufficiency. A remedy (e.g. creation of a non-profit foundation) to this constraint must be found and adopted.

The absence of representation of the private sector on the CICH is another apparent weakness. The Panamanian private sector could be an important source of CICH financing. The adoption of clean production technologies by enterprises located within the PCW would contribute to the Watershed's protection and conservation. Residents of the PCW can also provide valuable insights on structuring watershed management interventions in ways to maximize their impact. Providing local residents with the opportunity to participate in the CICH would facilitate their "buy-in" into efforts to manage and use PCW resources.

Finally, the CICH must assure that its basic operating principle, the process of consensus building, does not cause the body to be ineffectual. Attention to sound methods of organizational development, especially in the Commission's start-up phase, could weld the consensus process into a powerful tool for action.

Table CICH SWOT Analysis

Strengths	Weaknesses
• CICH is composed of several of the agencies currently working in the PCW. • ACP financial and administrative support. • Legal mandate. • The CICH is integrating government, civil society for a common purpose. • Offers financial opportunities to the watershed agencies.	• Potential of delegation to a level below that needed for decision-making. • Start-up organization; must build credibility. • Lacks "independent legal person" status. • Lacks participation of private sector. • Must rely on interaction of many organizations. • Lacks participation of PCW residents and local government
Opportunities	**Threats**
• Must provide leadership for effective management of Canal Watershed. • CICH starts with the transfer of the Canal to the Republic of Panama and it has the opportunity to grow into a reputable/recognized unit. • Can be a model of a self-sustaining watershed management entity. • Attached to the ACP it can adopt the Authority's corporate philosophy. • Satisfies a current need and does not have competition. • Presence of national and international interest in the Panama Canal Watershed because of the transfer of the canal (propitious historical moment). • Offers the opportunity for sufficient organizational and financial flexibility to permit agile action	• Failure to harmonize the legal bases (multiple laws and multiple sets of implementing regulations) for PCW management. • Disruptions in personnel and organizational roles brought about by Canal transfer and change of administration. • Need for ACP cultural change (engineering to include watershed management). • Exclusion of commercial private sector. • Scarcity of financial resources. • Institutional "in fighting". • Failure to adopt an aggressive, entrepreneurial posture. • Public "backlash" to CICH's activities especially with regard 200,000+ hectares recently added to the Watershed.

CICH's Functions

Scenario Analysis

To state the obvious, it is important to know what one is financing before developing a plan to finance it. As is understandable for a start-up organization, the CICH is in the process of setting upon its structure and processes. In the context of this evolving situation the initial blueprint for financial sustainability is framed by two possible scenarios, the Base Scenario or Scenario I, and the Enhanced Scenario or Scenario II for the CICH's structure and functions and procedures. Both scenarios can operate effectively. The alternative selected will be a function of the definitive scope of activity given to the Commission by its membership.

Scenario I

Briefly, the Base Scenario (Scenario I) will enable the Commission to carry out its mandate under the regulations of Law 19. The regulations assign the CICH five essential functions:

- Coordinate all activities to improve, protect and maintain the Panama Canal Watershed (PCW);
- With ACP support, finance and manage its own activities;
- Supervise, and monitor progress of all policies, programs and projects with respect to the improvement, protection and maintenance of the PCW;
- Evaluate and approve in the planning phase, all policies, programs, and plans regarding the PCW; and
- Establish and maintain a PCW environmental information center.

Additionally, the regulations specify that the CICH has responsibility for monitoring all projects implemented in the Watershed, and can solicit and obtain funds from national and international organizations.

These functions would constitute the services of the CICH under Scenario I. In essence, it casts the Commission's primary, and almost exclusive role, as one of coordination and supervision. Under this scenario, the Commission is an important forum for deliberation and "consensus-building" among entities engaged in Canal Watershed use and management matters. It would also serve as a "clearing house" for data, including information on sources of funding, on Canal Watershed Management initiatives. Implementation of PCW rehabilitation and enhancement activities would be carried out by technical line entities, many of whom would be CICH members, such as public sector ministries, Non-Profit (NGO) organizations, and commercial firms.

According to Scenario I, the CICH would consist of its members (representatives from the Ministries of Agriculture, Housing, and Government and Justice, the National Environmental Authority, The Inter-Oceanic Region Authority, the Panama Canal Authority and two NGO's - Fundación Natura and Cáritas Arquidiocesana) supported by a well-integrated staff—the CICH Secretariat. In an effort to contain costs, the Secretariat would be limited to the essential personnel

required (i.e., an Executive Director, an Administrative Assistant, a Secretary, a Project Officer, a Data Management Specialist with expertise in GIS technology, and a Financial Officer) to carryout its tasks. On a "special assignment basis", staff from the CICH's member organizations would be "loaned" to the Secretariat to assist with particular tasks (e.g., technical review and analysis of a proposed project in the Watershed). These seconded personnel will function as ad hoc Technical Committees.

Secretariat staff is also expected to have the support of appropriate ACP (e.g., Accounting, Marketing and Promotion) operating units. Fund raising activity, an essential part of the Commission's survival and growth, would be the responsibility, primarily, of the Executive Secretary.

Figure 1 CICH Structure (Scenario I)

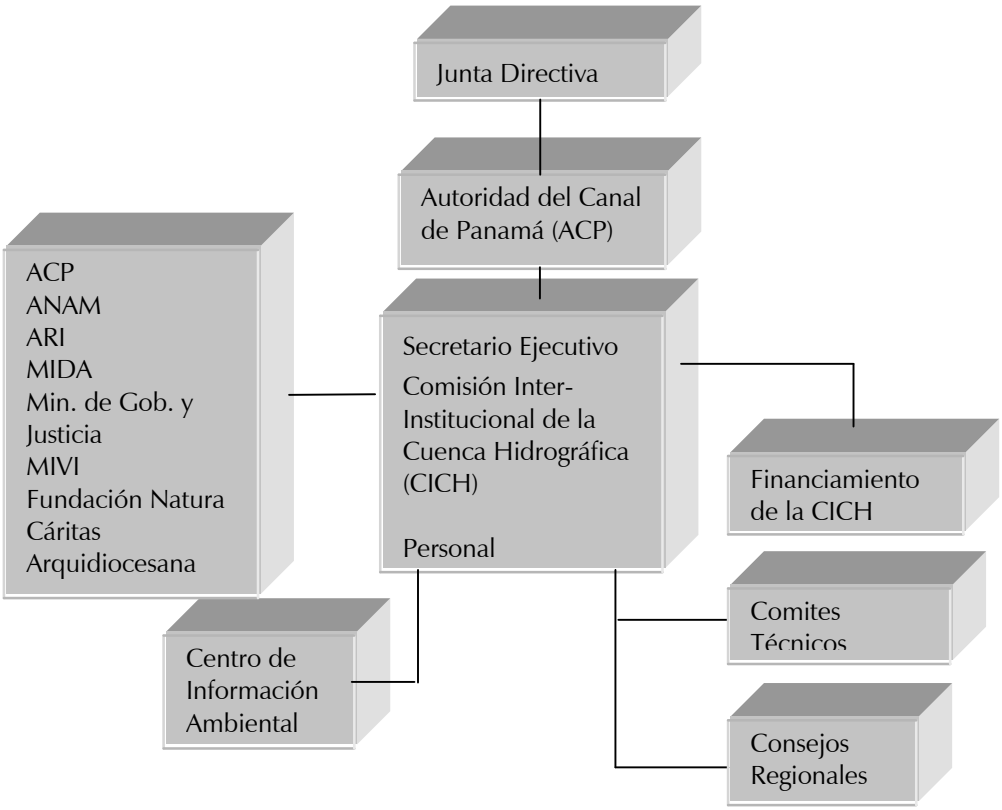
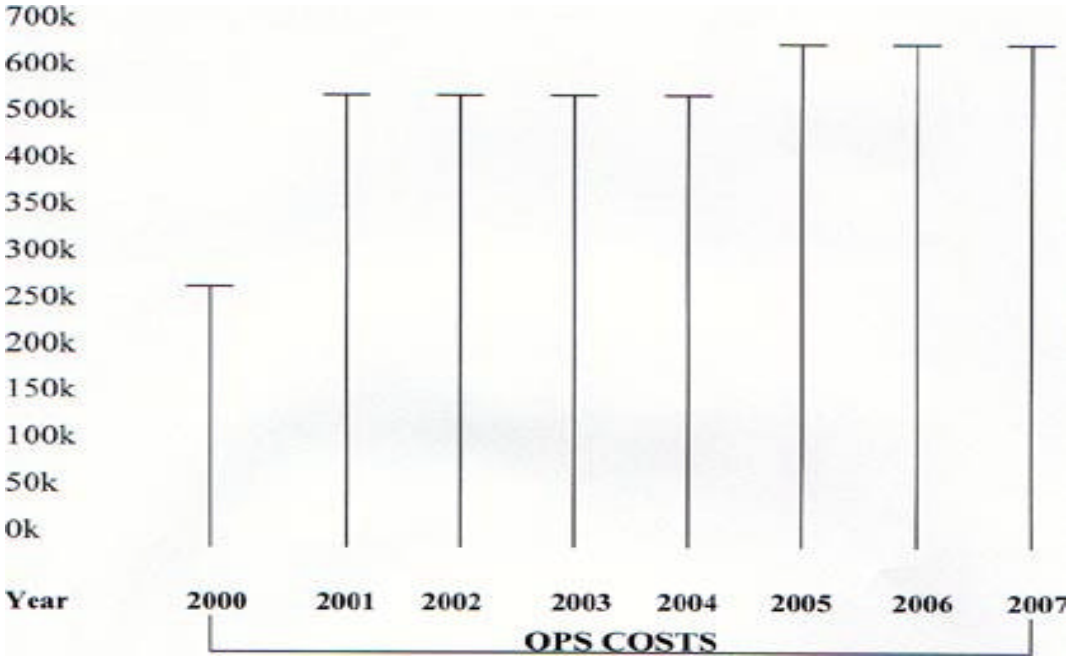


Table 2 shows the funding requirements for the CICH under Scenario 1. Starting from a pro-rated (one-half year) amount of $250K in the year 2000, the costs increase to 600K per annum in 2007. The largest increase ($250K to $500K) would be between 2000 and 2001 as the Commission would move from one-half

year to full year operations. Thereafter cost increases would be modest and would be required, in the main, to account for inflation.

Under Scenario I all financing needs would be for operating expenses (e.g. staff salaries, office maintenance, travel). There would be no program budget.

Table 2 Illustrative Funding Requirements (Scenario I)



Potential revenue streams for the CICH under the Scenario I are shown below. The key source of financing would be the ACP through budget transfers. The peak contribution ($480K) would occur in 2001. Thereafter ACP support would decline gradually until reaching a final phase out in 2007. Alternatively, support from ACP could continue on an infinite, but reduced, basis, in accordance with its legal responsibilities for protection of the water resources. The contribution of other CICH members, while small in comparison to that of the ACP, would be important. It would serve as a tangible commitment to and vested interest in, the Commission´s activities.

Contributions to CICH financing from other sources (e.g. ACP/CICH Secretariat fund raising and an endowment dedicated especially to support CICH activities in the PCW) would increase as the budget transfers from Commission member

organizations decline. The result would be a fully financially self-sufficient CICH, at a level of $600K/annum, in 2007.

Table 3 Illustrative Revenue Streams (Scenario I)

Year	2000	2001	2002	2003	2004	2005	2006	2007
Source								
ACP Budget Transfers	250k	480k	400k	250k	250k	150k	50k	
Other CICH Member Budget Transfers		20k	50k	50k	50k	50k	50k	
CICH/ACP Foundation Fundraising*			50k	100k	100k	200k	200k	200k
CICH/ACP Foundation Endowment				200k	200k	200k	300k	400k
TOTALS	***250k***	***500k***	***500k***	***600k***	***600k***	***600k***	***600k***	***600k***

* Merchandising, Corporate Giving, Fees-for-Service, Green Investment, etc.

Scenario II

Under Scenario II (Enhanced Scenario) the CICH's role is broadened to include the following functions — Policy Formulation and Watershed Monitoring/Special Projects. Inclusion of these functions would add a set of program activities to the CICH's portfolio. Additional funds would be required for these activities. This would require a modest increase the size of the Commission's Secretariat and a concomitant increase in the operating budget.

- **A Policy Formulation Function.** This would entail development and implementation oversight of Government of Panama-CICH policies related to the use, protection and maintenance of the Panama Canal Watershed. The range of topics might include analysis and formulation of policies related to land use, water quality standards, air pollution standards, investment financing guidelines price elasticity analysis for water and for energy user fees, evaluation of deforestation trends, research on solid waste disposition requirements, etc.)

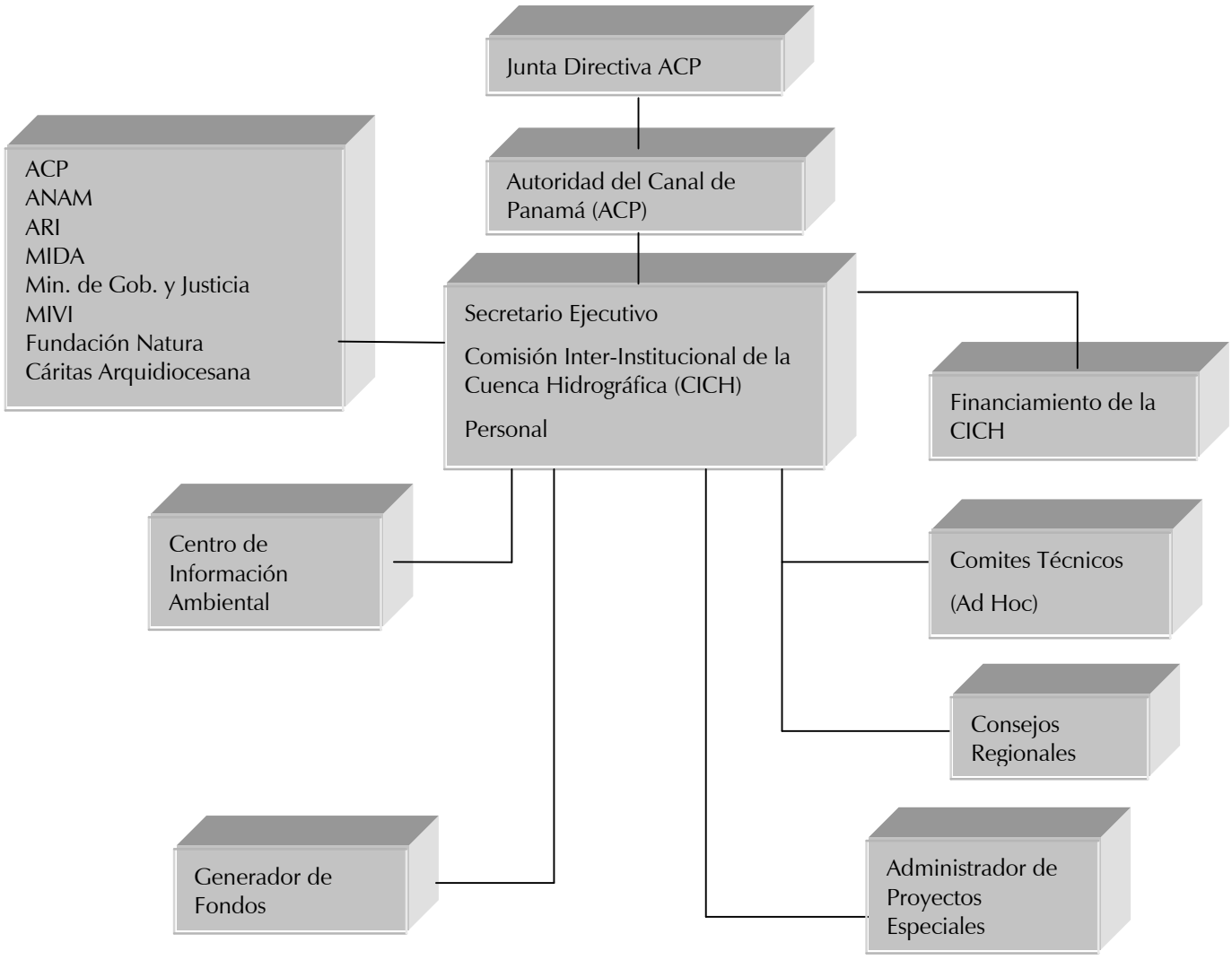
- **A Watershed Monitoring Function.** The Watershed Monitoring Activity would provide continual appraisal of the "state" of the PCW, with particular attention to such matters as water quality, sedimentation rates, land use patterns,

deforestation, erosion, as the "watershed upgrading works" are brought on-line and after they are completed. Problems detected would be channeled through the CICH to the appropriate line organization (in many cases this could be Commission members) for attention.

- **A Special Projects Function.** It is assumed that major investments to upgrade and preserve PCW so that it can meet the challenges of the future (e.g. agro-forestry, sewerage and solid waste removal, and physical infrastructure) will be carried out by private entities or by line organizations with CICH oversight. The Special Projects function would consist of financing for community-based watershed management interventions (e.g. village energy and potable water and waste water interventions, community-based agro forestry and small-scale eco-tourism investments). These would be modestly sized initiatives (not more than $50k) designed to respond rapidly to localized PCW issues. They would serve as a complement to the more encompassing activities undertaken by Panamanian line entities.

  Inclusion of the Policy Formulation, Monitoring, and Special Projects functions would require, as noted above, slight increase (e.g. a Fund Raiser/Development Officer and a Special Projects Officer) in the CICH Secretariat staff. The following graphic illustrates the Commission's composition under Scenario II.

Figure 2 CICH Structure (Scenario II)

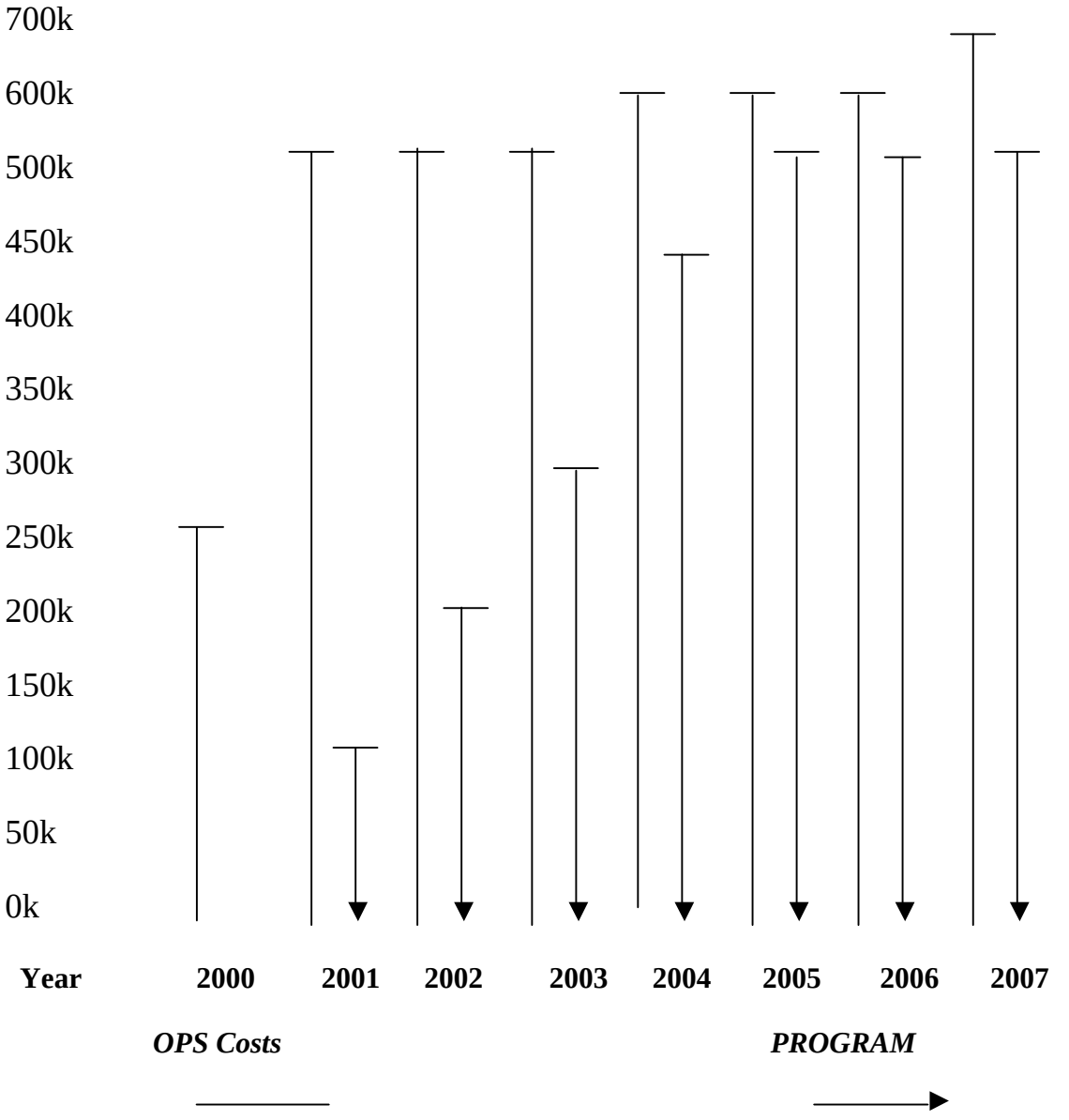


The financial requirements for the CICH under Scenario II are estimated at $1.2 million per annum by 2007. In comparison with the Base Scenario, operating expenses would increase slightly beginning in 2001 and be required indefinitely.

The most significant addition to the Enhanced Scenario budget is the inclusion of a "Program" line item in 2001. This would begin at the $100k level and gradually increase to $500k/annum in 2007. These monies would be used for Policy/Monitoring/Special Projects activities.

Table 4 below illustrates CICH funding requirements under the Enhanced Scenario.

Table 4 Illustrative Funding Requirements (Scenario II)



Scenario II would require a revenue stream configuration different from that of the Base Scenario. International Donor support would be sought to finance the Secretariat's program activities. Higher-level contributions from CICH/ACP endowment would be needed to cover the operating budget increase (approximately $100k/annum starting in 2001) that would result from the staff additions.

As with the Base Scenario, CICH member budget transfers, particularly those of the ACP, would gradually decline. Resources generated through dedicated sustainable finance initiatives would gradually replace these monies.

Table 5 below illustrates a theoretical revenue stream mix for the Enhanced Scenario.

Table 5 Illustrative Revenue Streams (Scenario II)

Year	2000	2001	2002	2003	2004	2005	2006	2007
Source								
ACP Budget Transfers	250k	480k	400k	350k	250k	150k	150k	
Other CICH Member Budget Transfers		20k	50k	50k	50k	50k	50k	
International Donors		100k	200k	300k	400k	500k	500k	
CICH/PCW Foundation Fundraising*			50k	100k	100k	200k	200k	300k
PCW Endowment				100k	200k	200k	300k	900k
TOTALS	***250k***	***600k***	***700k***	***900k***	***1 million***	***1.1 million***	***1.2 million***	***1.2 million***

* Merchandising, Corporate Giving, Fees-for-Service, Green Investment, etc.

Funding Sources

Potential funding sources for the CICH span a substantial range of possibilities. Descriptions of the most promising options follow. In a latter section of this report entitled "Recommendations", the potential sources of funding are arranged in clusters to best service the needs of the CICH.

- **ACP Direct Budget Transfer.** As mentioned earlier, according to Law 19 the ACP has the responsibility to support the CICH financially and administratively. The Authority has in fact assigned a sum ($730,000) to cover the Commission's first two years of operation. A decision could be made that the ACP becomes the "sole and perpetual" source of CICH support. The money, channeled through the ACP budget, would be generated by "rents paid by the passage of ships through

the canal"--a purely entrepreneurial venture--. Hence the argument could be made that the CICH would be financed, in a sustainable, non-subsidized way, by commercially generated revenues. An alternative would be to reduce, in a graduated manner, the ACP budget transfer support and replace it with funds from other sources.

- **Other CICH Member Direct Budget Transfers.** The CICH is composed of member organizations. All of the organizations are stakeholders with a vested interest in the Commission. To the extent that the CICH succeeds in its mission to manage effectively and efficiently the PCW the stature and reputation of all member organizations will grow. Moreover, each member has resources and manages a budget. Each member could be "assessed" an amount for CICH support. A formula that pro-rated the contribution of each member to the size of its budget would serve to assure equitable contributions among a group with control over widely disparate budgets. Exemptions could be made for organizations with serious resources limits. Making a reality of this "CICH Member Assessment" revenue stream would require a negotiation between the CICH/ACP and the other Commission members.

- **Proposal Submissions (International Donors and International NGO's)**. The international donor community (e.g., the World Bank [IBRD], the Inter-American Development [IDB], the U.S Agency for International Development [USAID], the Japanese International Cooperation Agency [JICA] and the European Union [EU]) as well as international Non-Profit Organizations (e.g., The World Wildlife Fund [WWF], Conservation International [CI], The Nature Conservancy [TNC], and The MacArthur Foundation) represent potential sources of financing. While these entities are more inclined to support program activities, they do have a history of contributing to operating expenses (e.g., USAID provided seed money for FIDECO), especially if the financial scheme emphasizes "self-sustainability" as is the case with an endowment.

- **Merchandizing**. The Canal, as well as the Watershed that supports it, offers the possibility of generating money through a commercial product merchandizing campaign. Memorabilia and souvenirs, representing the historic site proper (the Canal) as well as the biodiversity in the ecological niche that supports the Canal, could be prime possibilities. All such activity would be "market driven" --no product is launched until an acceptable, profit-making demand is identified for it--. Manufacture and sale of a wide range of items (e.g., clothing, handicrafts, maps, calendars, videos, photographs) could produce income to meet either operating or

program expenses. Such an effort could be linked to eco-tourism initiatives (see below) in the PCW. Product manufacture should be done by suppliers under contract to the CICH Foundation. Similarly, points of sale should be retail outlets (e.g., hotels, artisan stores, eco-tourism venues) that would stock CICH Foundation inventory. Revenue for the CICH would come from premiums, established through negotiated agreements, which retail outlets would pay for the opportunity to sell the merchandise. Management of this and other resource generation initiatives would be the responsibility of the CICH Secretariat's Fund Raising/Business Development Unit.

- **A PCW Endowment.** A trust fund, in favor of the CICH's activities, could be created within the ACP as a Private Foundation. Money to establish the endowment could be sought among the variety of international donors and foundations that support environmental/natural resource management activities (see Annexes). Procedures for creating such a mechanism would entail, inter alia, legal creation of a private, not-for-profit foundation, nomination of a Board of Governors (CICH members), and the naming of a staff (CICH Secretariat staff). Other important elements of the endowment are to structure it so that the "seed" money be invested thereby generating additional resources, and that a reputable financial management organization (e.g. a Wall Street financial house) be engaged to manage the account. Clear regulations must be adopted concerning the composition of the portfolio (e.g., equity instruments distribution, investment risk tolerance), acceptable and non-acceptable types of investments (e.g., investments in firms that are known polluters, or generate revenue from products antithetical to biodiversity maintenance would be prohibited). Guidelines must also be developed for use of the money including such matters as preservation of principle, specification of time lapse until earnings can be tapped, rate at which earnings can be drawn down, and the ends to which the resources can be applied (operating expenses only, program expenses only, or a combination of the two). Calculating a ten percent return on investment, an endowment of approximately $6 million would be required to underwrite all of the CICH expenses under Scenario I. Scenario II would require an endowment of about $12 million to guarantee financial self-sufficiency. Of course, endowments in combination with other sources of financing would reduce the needed size of the endowment.

- **The Existing Nature Conservancy/Fundación Natura Endowment (FIDECO).** The Nature Conservancy/Fundación Natura endowment (FIDECO) is an interesting possible revenue source. The endowment was established in 1995, with substantial international donor (USAID) support, at $25 million of seed

capital. A professional financial management firm, J.P. Morgan, was hired to invest/manage the resources. J.P. Morgan investments have generated $12 million for the fund. During the same five year period FIDECO, through Fundación Natura, has disbursed $7 million for environmental activities in Panama. The FIDECO endowment is reserved for program expenses, hence could not be a source of money to cover CICH operating costs. However, FIDECO regulations stipulate that 65 percent of its annual program budget (approximately $650,000 per annum) be dedicated to activities within the PCW. Furthermore, FIDECO reports that its "PCW earmark" is chronically under-subscribed. Accordingly, FIDECO could be a source of funding to meet the CICH's program costs under Scenario II.

- **One Stop Shop—Permits, Fees, and Licenses.** The PCW has become a priority area for development ventures. These investments include eco-tourism (e.g., nature reserves, village level eco-huts, eco-lodges, aquatic recreation-fishing and other water sports), destination resorts, industrial complexes, and commercial and residential property development. Enabling the CICH to set up a "one stop shop" for permits, licenses, and fees associated with commercial use of the Watershed would provide the Secretariat with a revenue stream that could be directed at either operating or program expenses. In addition, assigning the CICH this responsibility would assure direct linkage between the Commission's role in coordinating and approving watershed activities and the implementation of activities that it sanctions. If this proposal would conflict with the domain and revenue of ANAM, local governments and/or other governmental entities, consideration could be given to a "revenue sharing" arrangement between these entities and the CICH. One possible formula would be to create a "One Stop Window" within the CICH Secretariat, with the proviso that the revenue generated be distributed equitably among the other entities with a claim to it.

- **Resource User Fees.** The Watershed currently provides the water for canal operations, but also furnishes water for human consumption, and energy generation (hydro power) for a significant portion of the country. It is estimated that the demand for water for human consumption and for energy will increase as population grows, especially within the Panama City--Colon corridor, the country's major metropolitan area and the urban areas closest to the Watershed. Establishing and implementing a policy(ies) that establish fees for the use of the water services on to consumers, with a percentage of this cost dedicated to CICH activities, would contribute to the sustainability of both the PCW and the CICH.

- **Sale of Environmental Services.** Opportunities to utilize the PCW for environmental services should be explored. A prime example would be the use of existing forested areas or areas that are reforested (through forest plantations or natural regeneration) for carbon-offset purposes. Target clients could include national and international firms operating in Panama that emit greenhouse gases. The size of this potential market could be determined once the CICH Secretariat is established and operating. A portion of the money generated by such an effort could be used for CICH operations or programs

- **"Green" Investments.** Private sector interest in the Watershed is increasing, particularly in the field of eco-tourism. Canopy Tower and the Gamboa Tropical Rainforest Resort are examples of this trend. This interest offers the opportunity for the ACP to enter into joint ventures (assume equity positions) with private firms to pursue this burgeoning market. In turn, the ACP could designate a portion of the investment profits to support activities of the CICH. Clearly, investments of this sort would have to be approached from a business-like, "bottom-line" perspective; that is, they must hold a reasonable probability of success. Other benefits that could result from a "Green Investment" initiative would include: (1) sustainable use of watershed resources; (2) contribution, via job creation and generation of wealth, to economic development; and (3) identification of the ACP and the CICH as "true practitioners" of sustainable natural resource use principles. These types of initiatives could improve the CICH's financial position and, simultaneously enhance its reputation as an organization that "practices what it preaches."

- **Debt for Nature Swaps.** According to available data, Panama's international debt obligations are more than $6 billion. Over $2 billion of the money owed is public debt, that is, money owed to sovereign governments or public, multi-lateral organizations. It could be possible to reduce a portion of this debt and simultaneously generate resources for environmental purposes. A vehicle for doing so is a debt-for-nature swap: a cancellation of debt in exchange for a commitment to mobilize local currency in favor of environmental activities. ACP/CICH could negotiate with a creditor (a country holding Panamanian debt or a multi-lateral institution) to purchase outstanding Government of Panama (GOP) debt at a discounted rate (an amount, e.g., 20%, less than the debt's face value) with money raised from a donor organization. At the same time, ACP/CICH could negotiate separately with the GOP for cancellation of the debt provided the Government agreed to make available an amount in local currency (e.g., 90% of the face value of the debt) for a PCW management endowment. Three-party debt-

for-nature swaps have been implemented in about 20 countries worldwide. For example, in 1993, with $13 million in funding from USAID, and the World Wildlife Fund purchased $19 million in debt owed by the Government of the Philippines, which represented 68% of the debt's face value. In exchange for cancellation of the debt, the Government of the Philippines agreed to provide, the equivalent of $17 million in Philippine pesos (a redemption price of 90% of the debt's face value) to an environmental endowment.

- **Corporate Giving Campaign.** Data indicate that there are more than 40,000 National and International corporations licensed to operate in Panama. Of these a significant number operate in the PCW and the number will increase dramatically with the interest in, and potential for, commercial operations in the reverted areas. An active "corporate donations" program, perhaps dedicated to creation of a CICH Foundation Endowment, could tap this funding source. The campaign could emphasize the tax advantages, and "responsible corporate citizen" aspects of participation. Accordingly, private enterprises would benefit as would the PCW.

- **Special Events.** A Special Events campaign consisting of a linked set of unique activities (e.g., galas, raffles, telethons) designed to raise money for the CICH Secretariat could be undertaken. Emphasis should be on the benefits (biodiversity protection and economic prospects) that will derive from participation. The active involvement/presence of high profile figures (e.g., the Panamanian President, other ranking authorities in the government, members of the diplomatic community, private sector executives) should be sought to provide cachet and credibility.

Financial Management System

Sound financial management will feature a financial analysis and budgeting system. Mechanisms will be in place for budgeting for operations and capital expenditures, as well as for analyzing economic factors (investment opportunities, financial markets, inflation) related to taking decisions to maximize return on investment and profits. Quality financial management will also take into account capital requirements and will be up to date on sources of both short-term and long-term capital. Cash management mechanisms (e.g., banking arrangements, receipts, custody and disbursement of securities and money, and credit collection) will be in place as will be accounting and control (e.g., accounting policies, accounting data reporting, cost accounting, internal audit, and asset protection)

procedures. In addition, tax administration and insurance systems will have been established and a computerized management information system installed.

The ACP has a professional financial management system. Its effectiveness has been demonstrated through the administration of a $500 million per year operation. To be sure, the system in place is that of a public sector bureaucracy (it was developed by ACP's predecessor organization, the Panama Canal Commission which was a U.S. Government entity). As the Authority moves toward assumption of a more private sector, "bottom line" corporate culture, consideration might be given to modifying some of its financial management practices (e.g. sharpen cost accounting procedures for administrative expense items). However, the ACP's system is more than adequate for managing the CICH's financial transactions (the current plan is for the CICH to adopt and be supported by the ACP's financial management system).

Attached as annexes to this report are several charts that demonstrate the detail that should be employed in managing the CICH's finances.

Recommendations

The financial self-sufficiency of the CICH is likely to be difficult but is feasible. The recommendations that follow are a series of key "next steps" which, if taken, will result in the Commission's financial sustainability.

Evolution

It is recommended that the CICH begins operations by focusing on the role (e.g. coordination of PCW management activities) described under Scenario I. It is also recommended that the Commission evolve to assume the broader role described in Scenario II (inclusion of policy, monitoring, and special project functions). Explicit CICH leadership in policy formulation will assure that all PCW interventions are carried out in accordance with established Government positions regarding the use of Watershed resources. CICH-led watershed monitoring will facilitate early detection and treatment of problems as they arise. Management of a Special Projects fund will provide the Commission with flexibility to quickly address "localized" watershed management issues. It would also afford the CICH the opportunity to interact closely with PCW residents thereby facilitating local community "buy-in" to PCW management initiatives.

Cost Consciousness

Financial self-sufficiency requires that costs be kept under control. A critical determinant of budgetary cost is the size of operating units (normally the larger the unit the greater the cost to maintain it—and the converse). It is recommended that the staff size of the CICH, especially the Secretariat, be kept to the minimum required to carry out its responsibilities (suggested staff configurations under both the Base and the Enhanced Scenarios to this precept). It is also recommended that other cost containment measures under consideration (e.g. secondment of line organization technical staff to carry out specific tasks) be adapted and used.

Marketing Plan

It is recommended that the CICH develop and put into action a two-track marketing plan. Track One would be internal to the CICH and would focus on "selling" the idea to CICH members of the benefits to be realized through cooperation and joint action on developing cooperation among member institutions. The "internal cooperation" issue must be a topic of constant attention and CICH leadership must be skillful in demonstrating the mutual benefits of unified action. Periodic team building exercises among Commission participants could help in this regard. International donor supported technical assistance is available and should be utilized to organize team building exercises.

Track Two would deal with broadcasting the CICH's program to the Panamanian society writ large in order to garner its understanding and support. Tactful use of the media could be of assistance on this matter. Articles in newspapers on CICH programs, a speakers program featuring Commission members making presentations on watershed activities and periodic radio/television programs on CICH activities are examples of types of media interventions. The ACP's Marketing Division could be enlisted to assist with developing and implementing a public awareness program. ACP assistance to the CICH in context would be in keeping with the legislation that created the Commission. It would also help contain CICH costs.

Revenue Stream Diversification

In order to manage risk and assure that the financial sustainability objective is achieved, it is recommended CICH diversify its revenue streams. It is also recommended that the CICH prioritize potential revenue streams and concentrate

on those, which offer the greatest (surest) ease of access and/or the largest amounts of money.

Specific suggestions are as follows:

Divide the alternative revenue sources described above into two groups: core streams, ancillary streams:

- Core Streams would include
  - ACP budget transfers
  - Proposals (International Donors and NGO's)
  - Creation of a PCW Endowment
  - Special Events
  - Access to FIDECO Trust Fund
- Ancillary Streams would include
  - One Stop Shop—Permits, Fees, Licenses
  - Resource User Fees
  - Sale of Environmental Services
  - Green Investment
  - Debt for Nature Swaps
  - Corporate Giving Campaigns
  - Other CICH member budget transfers

Core Revenue Streams

Core revenue streams are defined as those sources of financing that are most likely to generate the bulk of the CICH's resources. It is believed that these are feasible within the short to medium term in Panama. In most cases they are the easiest to access. It is recommended that the CICH concentrated, at least initially, on the core streams to generate the needed revenue. The following are a set of concentrate steps that can be taken to launch a successful financial sustainability campaign.

- Continue to obtain funding from the ACP.

- Develop a proposal for an endowment dedicated to PCW management for submission to International Donors and/or International NGO's. Points for emphasis in the proposal should be biodiversity conservation, economic impact, financial sustainability and CICH/ACP matching fund contribution. Gestation period for such funding could be lengthy (12-18 months) so there is a need to begin immediately. Donor-financed technical assistance is available to assist with proposal development and submission.

- Develop a proposal for submission to International donors and/or NGO's for the policy formulation monitoring/special projects activities. A one-year gestation period would be required to develop the proposal and bring it on-line. Donor-financed technical assistance available to assist with proposal development. The proposal should be marketed to a sub set of the organizations that appear in the "Funding Source" graphic that is attached as an annex to this report.

- Establish a Foundation for the PCW. As noted earlier, the CICH does not have "legal entity" status. Hence it cannot raise money on its own. Creation of a Private Foundation would address this constraint.

- Special Events. Program and carryout two special events per year.

- Engage FIDECO immediately on the possibility of funding for CICH activities.

Ancillary Revenue Streams

As the term suggests, ancillary revenue streams would be sources of funding that would complement money raised through the core streams. Some of these possible funding sources (e.g. green investments and debt-for-nature swaps) would have long gestation periods before yielding money. Their feasibility within the Panamanian context would have to be carefully studied. Others (e.g. sale of environmental services and fees/permits/licenses) could require negotiation among CICH members regarding the distribution of revenue generated. It is recommended that potential opportunities be pursued, but that they be pursued from the perspective as complements to core revenue stream generations. Specific recommendations are:

- Examine possibility of generating revenue for CICH through the commercial marketing of environmental services.

- Engage CICH members on feasibility of establishing “one stop shop” for PCW licenses, fees, permits and possibility of directing a portion of the revenue generated by such means to finance CICH activities.

- Conduct an analysis of merchandising possibilities. The study should include product identification, a profitability analysis for each product and distribution. The study should also include a schedule for bringing products, hence revenues, on-line. Again donor-supported technical assistance is available to help carryout this study.

- Negotiate immediately within the CICH member group budget transfer contributions (ACP contribution commitment for first two years has been made) from all (most) members.

- Explore feasibility with Ministry of Economy and Finance and a public creditor (e.g. and International Donor) of a Debt-for-Nature Swap. Proceeds from such a swap would be transferred to the CICH/PCW Endowment Fund.

- Initiate a corporate giving campaign.

  Fund-Raiser. Add a Professional Fund Raiser to CICH Secretariat early in 2001 to manage revenue generation activities.

  Expand CICH membership. Include private sector in the CICH at the earliest possible date. Inter alia, the private sector represents an important source of financing.

Annex A Potential Public/Private Sources of Funding

SOURCE	ACTIVITY
World Bank	• Institutional Strengthening • Special Projects
IDB-MIF	• Institutional Strengthening • Special Projects
UNDP	• Special Projects
European Union	• Endowment
USAID	• Institutional Strengthening
USG **(Tropical Forest Conservation Act-Relief for Nature)**	• Endowment
JICA	• Endowment
Nordic Bilaterals	• Endowment • Institutional Strengthening
Spanish Bilaterals	• Endowment • Institutional Strengthening
CIDA	• Special Projects
Institutional Foundations Ford MacArthur Hewlett-Packard Microsoft Goldberg Disney	• Endowment • Institutional Strengthening • Special Projects
International NGO's The Nature Conservancy (TNC) Conservation International (CI) World Wildlife Fund (WWF)	• Endowment • Special Projects

Annex B CICH start up costs

Executive Secretary			
Secretary			
Finances and Administration			
Direct Expenses			
Rent			
Office suplies			
Furniture			
Utilities			
Publications			
Travel Expenses			
Air tickets			
Transportation			
Perdiem			
Total General Administration			
Operating Expenses			
Salaries:			
Environmental Impact Officer			
Computer engineer			
Training coordinator			
Consultants:			
Environmental Consultants (studies)			
Marketing Consultant			
Workshops facilitators			
Coordination - Logistics			
Special projects:			
Information System			
Environmental Clearing House			
Marketing Campaing			
Stakeholders Analysis			
Training program			
Logistics:			
Transportation			
Vehicles			
Maintenance			
Insurance			
Materials:			
Promotional Brochures			
Events			
Meetings, roundtables, workshops			

Appendix 5

Preliminary Analyses Of An Environmental Data Management System For The CICH And Participating Agencies

Executive Summary

This document deals with geo-spatial and other forms of data for the Panama Canal Watershed**.** It presents a preliminary assessment of existing data, and a preliminary evaluation of a system of data management for the CICH's Environmental Information Center. The focus of the paper is on a discussion of the different data sets that are available, the organizations that maintain them, and an identification of some of the major gaps in the data that, for purposes of establishing an Environmental Information Center (Center) for the CICH, may need to be remedied.

The document presents a brief discussion of the assessment of the available databases, some details about the agencies and their equipment, including hardware and software are presented in Table 1. With two major exceptions, there is a general lack of documentation (metadata) for the databases; both ARI and the Panama Canal Watershed Monitoring Project (PMCC), a joint activity of USAID, ANAM, and the Smithsonian Tropical Research Institute (STRI), have already developed comprehensive data dictionaries for their extensive holdings. These dictionaries have been made available by both ARI and the PMCC.

This report also presents an assessment of data gaps. This assessment is brief, due to an inability to carry out a more comprehensive assessment of the CICH's data needs. Nonetheless, several serious data gaps are identified in this paper and recommendations are offered for how they can be remedied.

Preliminary suggestions are made with respect to staffing and hardware/software options. Two scenarios are presented that outline possibilities for recruiting of personnel that will be needed to staff the proposed Center. Preliminary equipment specifications are included in Annex B.

Assessment of Data Availability for the CICH´s Environmental Information Center

Introduction

This is a preliminary assessment of the data that is available to the CICH Secretariat staff and agencies participating in the CICH to support their role as custodians of the Panama Canal Watershed (PCW). The CICH will form a new Environmental Information Center (Center) whose function will initially be to serve as a repository of *all* information relating to the PCW environment. While the Center must evolve into a decision-support system for the CICH, the data repository function is to serve as a single source where all those whose responsibility or concern with the PCW may go to obtain the most up-to-date and reliable data that are available. The focus and scope of this paper is oriented towards this Center and to assess the state of currently available data and their data management systems that would be expected to be incorporated into the Center's database.

Most, but not all, of the information needed for watershed management is geospatial data (data reflecting characteristics of important aspects connected to a point or points located in geographical space). The Center Staff should include a data management specialist with significant experience and training in Geographic Information Systems (GIS).

The CICH role is to ensure the environmental sustainability of the PCW. First and foremost is the hydrological sustainability of the PCW to produce water of the quantity and quality to meet the requirements of normal canal operations (plus an operating reserve) as well for any future expansion of the canal's throughput. To this should be added the need to meet future demand for municipal water supply, for hydropower generation, and for industry. The problem of water supply for the metropolitan areas of Panama City and Colon is especially important. Therefore, the Staff's data needs will be presupposed to give the highest priority to the multi-faceted and complex hydrological sustainability of the PCW.

An integral component of the administration and operation of CICH is the storage and management of data for the purpose of monitoring and evaluating the environment of the Watershed, reviewing and assessing any and all proposed

activities that could affect its environment, and developing policies to achieve the desired results.

Available Databases

The PCW has an abundance of geospatial (GIS) data available. As previously noted, much of that data are not well documented (metadata are absent or inconsistent). Table 1 contains a list of agencies and summaries of their databases/data sets; some agencies have collaborated for a long time with others in elaborating geospatial data for the PCW; these include ANAM and STRI that have collaborated on the Proyecto de Monitoreo de la Cuenca del Canal (PMCC). Table 1 contains some specificity about data such as scale but database details such as attribute data are to be found in the data dictionaries of the particular agencies, such as ARI and the PMCC.

Table 1 Geospatial Data Sets

Agency or Organization (Contact Person)	Geospatial Database Availability and Details	Scale RF (Denom.)	Geographic Level	Additional Information	Other Data Sets Available
CICH Participants					
ACP (Raúl Martínez)	Population Centers (800) Drainage Network Water Supply (Tabular) Topography (10 meter Contour Interval) Landsat-5 images (2 for extended PCW) Satellite images, Ikonos, to be purchased by Canal Capacity (ACP) 31 mosaics 18 km x 18 km, panchromatic (1 m res.) and 4 bands (5 m res.)	50,000 50,000 25,000		ARC/INFO 1998, 1999	 10 meter DEM new construction land tenancy
Under development	Land Use Forest Cover Urban Settlements Socio-economic patterns (at same level as Urban Settlements)				
ANAM (Bienvenido Castillo)	Cuencas Hidrográficas Sistema Nacional de Áreas Protegidas (Actualizado) Uso de Suelos Recursos Hídricos	250,000 250,000 250,000	National National National	ARC/INFO ARC/INFO ARC/INFO ARC/INFO	

Agency or Organization (Contact Person)	Geospatial Database Availability and Details	Scale RF (Denom.)	Geographic Level	Additional Information	Other Data Sets Available
	Principales Lugares Poblados	250,000	National	ARC/INFO	
	Zonas de vida	250,000	National	ARC/INFO	
	Ocurrencia de Incendios	250,000	National	ARC/INFO	
	Cobertura Boscosa	250,000	National	ARC/INFO	
	Red Vial	250,000	National	ARC/INFO	
	Zonas de Desastres (vulneribilidad)	250,000	National	ARC/INFO	
	Corredor Biológico Propuesto	250,000	National	ARC/INFO	
	Comarcas Indígenas	250,000	National	ARC/INFO	
	Existencia de Manglares y Corales	250,000	National	1986, 1992, 1998	
	Landsat imagery (1998 is to be purchased)	250,000	?	?	
	Radar imagery (planned acquisition)	250,000	?	?	
ARI (Iliana Mora)	Extensive coverage and documentation for PCW	various	Interoceanic Region		
Contraloria Census	See baody of Appendix				
MinGobJust	See baody of Appendix				
Cáritas Arquidiocesana	No digital data. See boady of Appendix				
Fundación Natura	No digital data. See boady of Appendix				
OTHER ORGANIZATIONS	Listed in order of their importance				
PMCC (Marcelo de la Rosa)	Hydrology, land use, forest cover, contaminants, streams, subwatersheds	various			
Human Population	Census data by jurisdictions, solid waste dumping, etc.	various			
ANCON (Dilia Santamaria)	Much GIS digital data for small areas at	100,000	Project level	1994/95	Aerial photos
	Vegetation coverage (flora with its associated fauna)	100,000	watershed	1995/96	
GEOINFO (private enterprise)					
National level	Businesses, census, schools				
Municipal level (Panama, Colon)	Buildings, principal streets, political subdivisions, etc.				$13,500
Panama Canal	Infrastructure, topography, coasts, lakes, towns, etc.	50,000			
MIVI (Dalys de Guevara)	No DBs; Zoning Maps produced by ArcView				
IDAAN	No DBs; Plans for eventaul development				

The inadequacy or total absence of metadata for many of the important sources of data is likely to present problems for data analysis into the future. A particularly apt example of this weakness is the ANAM database, especially by contrast with the PMCC and ARI databases that are more thoroughly documented.

The GIS and remote-sensing specialists in the PMCC, ACP, ARI, ANAM, and the ING all seem to be very competently trained. There may be some need for maintaining their competency or even upgrading it. One of the major contributors to this may well be the uniformity of the GIS equipment nearly universally in the country (with the major exception being census data). Almost all organizations that use GIS data rely on ESRI-based systems such as ArcInfo and ArcView. As a result, there is overwhelming agreement that this is the type of software that should be used for GIS support of the CICH Environmental Information Center.

Geographic Databases exist at ACP, ANAM and ARI. ACP has data that includes rainfall, hydrology and water quality. ANAM has a combination of various data. ARI has mapping and land use data. Fortunately to simplify decisions in the future there is a commonality in system use throughout the CICH associated institutions; the GIS systems used are Arc/Info and Arc/View which have local support through GeoInfo, S.A.

ACP has geo-referenced tabular and spatial socio-economic data of populated areas obtained from Contraloria of the 1990 census. Data available varies in age and some of it is out of date. ACP data include drainage net in maps at a scale of 1:50,000, road grids at 1:250,000, topographic data at 1:50,000, houses and streets at 1:5,000. ACP has started, as an integral part of their mandate, to obtain data in the areas of land use, forests, zoological, water utilization, hydrology, flow volume and altimetry to fulfill ACP responsibility for these areas. All data mentioned above cover the “traditional” Watershed, but data, outside of some feasibility studies currently underway, is still not available for the recently extended area of the Watershed. Additionally, ACP also has data provided by “Monitoreo 2000” (Louis Berger, Inc.) for water quality in the center of the Watershed where 52% of the population of Panama lives and where the water quality problems exist. ACP has six stations, three on each side of the Watershed, to measure water quality. Water quality is measured by fieldwork, laboratory and field instruments. Water monitoring is performed on a monthly basis. ACP is planning the purchase of three stations that belong to ETESA, formerly Instituto de Recursos Hidraulicos, and want to install automatic stations to measure flow

and quality. ACP uses ESRI GIS and Windows software and has a LAN-network to communicate internally.

ANAM has geographic information on the following areas: Proposed Biological Corridor, National System of Protected Areas (very current), Indigenous Areas, Water Resources, Fire Sites, Wild Life Zones, Mangroves and Corals Inventory, Forested Areas (data from 1986 and 1992), Road Grids, Disaster Vulnerability Zones, Hydrographic Watersheds, Land Use and Main Populated Centers as part of their national responsibility to produce environmental reports. In addition, "Monitoreo 2000" (Louis Berger, Inc.) located at ANAM, has an available database that contains the following data: Populated Areas, Fauna, Flora, Hydrology and a GIS System. Working with the ACP, "Monitoreo 2000" is in the process of covering environmental health, monitoring insects in what is called IBI, Integrated Biological Index. They would like to start a project to include amphibians and plant life. They are in the process of studying forest cover throughout the last thirty years. "Monitoreo 2000" is also trying to encourage ANAM to undertake biological assessment to determine nutrients, and where human intervention has caused erosion through land use of grazing lands, and contaminants (excepting heavy-metals). ANAM uses perfectly adequate personal computers 128K, 500 MHz and ESRI's Arc View, ARC/INFO and has a license for Spatial AutoCAD; database software is Access and Excel. They want to procure Sybase and Oracle. They are developing their Internet web page and it is expected to have it available in approximately two months. ANAM is about to begin the process of implementing the SINIA, National Environmental Information System, developed and tailored for their use by Clifton Associates through a package by the name of ENVISTA. Canadian Government Aid is facilitating this endeavor.

ARI has a GIS system produced originally by Nathan Associates, Inc., but data date to 1996. Data cover contaminants of various types including explosives, and land sold, rented, etc. Like other CICH associated institutions ARI also uses ESRI's Arc-View, ARC/INFO and AUTO/CAD and database resides in Access and their hardware is similar, Pentium III personal computers 128K, 360MHz. ARI is also planning to be on the internet.

The Instituto Geográfico Nacional "Tommy Guardia" has a GIS to produce mainly topographic maps, nationally. Hardware is a DEC, 133MHz with two terminals and personal computers running Windows 95 and Ultrix 4.3 software plus Arc View, ARC/INFO (in their case, the older version 6.1) and AutoCAD.

They do not have ERDAS to interpret imaging, though. Their data is from 1987 and their scale 1:50,000.

MIVI has a database that includes data for the cities of Panama and Colon only. It consists of data to produce density maps that do not have attributes, and there is no program for a GIS. Arc View has primitive tables of land use in the two metropolitan areas. MIVI runs a small network of seven personal computers. An interesting comment was made that when they have to get data from ARI's database they are charged a user's fee as they do not have a Geo-Info license. This issue should be clarified or investigated to see its effect in other areas of the CICH.

Potential Matters of Concern – Restricted or Incompatible Databases

A potential matter of concern for a major data source for the Center is the incipient development by a Canadian company, Clifton, Inc., for ANAM funded by CIDA. The effort is directed towards the incorporation of the ANAM database into their proprietary system, *Envista*, which is a super-packaging of GIS packages like Arc View, along with other query modules and graphical packages. *Envista* itself is an impressive product that was developed for Canadian mineral companies' requirements for addressing environmental quality issues. It has been applied to meet ANAM's user needs and has apparently been tentatively accepted as the principal access medium to the ANAM database. One of the major impediments to such access, of course, would be the necessity of having to acquire by separate license arrangements. Another is the cumbersome matter of having to use more complex software than required by the CICH staff. This will require some considerable special attention.

Although Contraloria General is not a member of the CICH, it can provide cartographic, hydrographic, roads, land-use, agronomic, and socio-economic data to the CICH. Use or transfer of data from the Contraloria can represent two additional problems: 1) Costs; since Contraloria has invested $1,500,000 in equipment, software and training their plan is to collect fees for some of their possible services, including map printing, file downloading, etc. For example, printing a requested map will cost a user around $8 or $9 per sheet. Contraloria, being a Governmental institution, might not levy charges to CICH, however, that should be determined when the entire charter of CICH and its relationships with other institutions is defined; 2) Compatibility; although CICH's associated

institutions are generally using ESRI-based GIS, the Contraloria is not. It is currently using Intergraph equipment to manage census data, data that is crucial to the work of the CICH. This equipment, and software compatible with it, is difficult for communication with all the other GIS users who are employing software from ESRI and its partners. The Contraloria intends to move to a GIS basis by the end of the year. The Contraloria is heavily committed to using Intergraph-based Geomedia GIS. The basic problem is incompatibility between ESRI and Intergraph. This incompatibility is not necessarily an insurmountable obstacle, but requires further investigation.

The Contraloria's software uses Oracle 8 as a platform and a Visual FoxPro Database System. The Contraloria's hardware consists of 19-Pentium II personal computers with 128 K Ram, 8 Mega and 350 MHz, and state-of-the-art scanner and plotter. The mapping scales range from 1:2,500 to 1:50,000. Geo-spatial data sets are not available currently but the plan is to have them by the end of the year 2000. Contraloria plans include Geomedia Web Map. Cartography data are presently in CAD format but migration to GIS is currently in process. Microstation is used for data transmission between facilities.

Other Potential Users of the Environmental Information Center

MIDA does not have either a database or a GIS. It has an inventory of environmental projects. As a member of the CICH, MIDA would like models and to be able to access hydrological, general land-tenure, and economic land use data for decision-making and to formulate macro strategies. The FAO has provided assistance to MIDA in the past in studies of cattle and agricultural production. MIDA is very interested in the development of CICH to be able to access needed data. MIDA does not own any computer hardware.

Sondear (formerly Technoserve) is an NGO implementing rural projects as a contractor for different governmental, and non-governmental entities, among which are: ANAM, MIDA, USAID, Contraloria, Smithsonian, ANCON, local governments and Instituto de Mercadeo. Sondear is concerned with produce market prices, since these are areas where they perform projects. Sondear's hardware consists of four personal computers, 7 GB and 200 MHz where they process some socio-economic data with spreadsheet and Word 97 word processor. Sondear is interested in rural socio-economic data that might be part of CICH's database in the future.

Cáritas Arquidiocesana is an NGO concerned basically with issues related to the inhabitants of the Watershed. Cáritas Aquidiocesana would be interested in accessing CICH socio-economic data. ACP has contacted and given survey forms to Cáritas Arquidiocesana to express their data interests. Word processing is basically the software used in their few personal computers.

Fundación Natura is a "fideicomiso" (long-term bank deposit) organization that provides financing to various projects from funds derived from grants made by three partners in their institution, GOP: $18M, USAID: $5M and The Nature Conservancy: $2M. As possible users of the CICH database, Natura is interested in receiving information on their funded projects in hydrology, meteorology, forestry, etc. and location and project-type funded by other parties, such as: USAID, Japanese Assistance, World Bank, etc. Natura's hardware equipment consists of 10 personal computers which include a Pentium III server 128 MB expandable 1024 MB, hard disk 9.1 GB, cache 512 KB, 500 MHz. The other nine PCs range from 16 to 64 MB in memory, hard disks range from 1.6 to 10 GB, half of the computers have a cache of 512 KB, MHz range from 133 to 500. They have an integrated system Systimax Powersum structured cable, Office Connect 56K V90 LAN modem 3C886 for 25 users. They are connected to the Internet and every computer is equipped with Internet Explorer 5.

Assessment of Potential Data Gaps

A review of Table 1 will not reveal the amount of data available to support the Center's database because it is both large and dispersed and it lacks metadata. What can be gleaned, however, from Table 1 are potential gaps, i.e., what is *not* included in the existing data collection. Below is listed the most important of the potential data gaps.

The most glaring omission is that there should be data available either from the Ministry of Public Works or from the National Institute for Water Supply and Sewers (IDAAN) about water supply distribution networks and wastewater collection networks.

Wastewater is particularly crucial in that such data would relate the consequences of urbanization (fecal coliform counts from failed septic systems, direct sewage discharges, etc.) with the environmental health of the Watershed. The problems in the PCW are most likely going to be connected to rapid industrialization and rapid urbanization both within and on the perimeter of the PCW.

Another related, but distinct map layer, concerns aquifer recharge areas. The hydrologic equilibrium of the Watershed, with its seasonal precipitation pattern and its relatively uniform withdrawal pattern, requires the supply of water for canal operations to come from surface water and groundwater storage. Thus, it would appear important that such aquifer recharge areas be not only mapped for subsequent monitoring, but also for the CICH's consideration of them for priority protection status.

There is one other apparent gap in the Panama geo-spatial data and it concerns remotely sensed imagery. Landsat images are expensive to acquire and to interpret into useful products. Currently, this is only being done in two governmental agencies, ACP and PMCC (ANAM), and in ANCON. The latter is a special case; ANCON is concerned with environmental conditions in the Watershed as well as the entire country. They have a great deal of project-level data that could be of potential use to the CICH, but even more important is their potential to carry out investigations using CICH data. It is not unlikely that they could become a principal client of the Center as well as a major contributor.

Recommendations for Reduction/Elimination of Potential Data Gaps

The gaps in the Center's data mentioned above, as well as gaps that have not yet emerged, can most readily be remedied by the use of the recommended option (2) for the Center's staffing (see following section). That recommendation, if implemented, would put in place staff members already experienced in the filling of data gaps for watershed management in the PCW, gaps of all types and from all types of agencies and organizations. If the recommended option were not to be implemented, the hiring of staff that have these characteristics will nonetheless be identical.

In order to provide a single source of imagery (Landsat, Ikonos, SPOT) it is recommended that in the future such imagery be obtained by the Center upon request from a participating agency like ACP or PMCC. Though the Center itself will have no capacity to interpret the imagery, the images will belong to the Center (though the digital originals may be on indefinite loan to the requesting agency). This approach is consistent with the objective outlined above, namely that the Center will be the one-stop shop, a repository of all data for the Watershed.

With respect to satellite imagery, another type of geospatial data mentioned in *Cuenca*[36], from which the following is quoted: "Se recomienda realizar levantamientos periódicos de la cobertura boscosa y los usos del suelo de la Cuenca del canal; cada 5 años para toda la Cuenca y al menos cada 2 años para las áreas críticas. Se sugiere utilizar imágenes del radar para regiones nubosas de la Cuenca. El radar atraviesa las nubes; además sus imágenes son menos costosas (p. 104)." While radar certainly does that, it is also true that LIDAR (LIght Detection And Ranging) will accomplish this as well, if not better. In Washington State recent tests conducted by the U.S. Geological Survey have shown that LIDAR is superior to radar for purposes of altimetric control for digital terrain mapping due to its ability to penetrate cloud cover and vegetative cover as well.

Center Staffing and Hardware/Software Options

Staffing

In order to accelerate the creation of the Environmental Information Center as the central data repository for the PCW, the following options should be carefully weighed for their relative advantages/disadvantages:

Create a new group from existing staffs at other agencies or organizations. This would permit maximal flexibility in staffing. Among the several agencies with trained personnel there are many who are qualified for transfer to the Center. (This would have the consequence of weakening the existing agencies.)

Import or transfer an existing group into the CICH that already has GIS expertise and watershed experience in Panama. This would not only be the fastest start-up option, it could be financially viable as well. Specifically, it is recommended that the staffing of the Center be the result of a transfer of the Human Population component of the "Programa Monitoreo 2000" to the CICH. This motivated and versatile group is among the most highly trained GIS groups in the country and already has the substantive watershed background needed by the CICH. On-the-job training would, therefore, be minimal, or none.

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[36]" La Cuenca del Canal: Deforestación, Urbanización y Contaminación," publicado por STRI, USAID y ANAM

Hardware/Software

There is overwhelming agreement about the type of software to be used for GIS support of the CICH, including both the ESRI software but also remote sensing software for the classification of satellite imagery (ERDAS, ESRI). The main, if not the sole, exception is the Census within Contraloria.

Possible vendors were visited to determine which hardware, software and communications could be used. The following vendors were visited to find out the appropriateness of their products:

Envista Technologies, Clifton Associates that is a Canadian software company in the process of installing their Envista software package at ANAM as the SINIA System. It is relevant that the original design of this software package was to process mining data and that the package has been tailored to ANAM's requirements based on process similarities. The system is solid, with multiple processing options that probably will exceed the near future needs of CICH, and in addition will have associated high costs due to licensing for use of the product at both CICH and associated institutions.

GEOINFO, S.A., the local representative of ESRI's products, to see product availability and prices for GIS software products commonly in use by associated institutions of the CICH. Current prices were obtained for Arc View 3.2. Arc/Info NT 8, Internet Map Server (IMS) for Windows/Windows and ArcSDE 8 software and various geographic data bases that currently can provide information on a variety of data on buildings, streets, road infrastructure, population centers, etc.

Multitek, Multimax and Computer World hardware suppliers, provided quotations on one computer that met the criteria for processing and storing data at the CICH (see Annex C) In addition to quotations they also provided literature on hardware.

Based on data communications, and the current data transfer situation, it was decided to visit the project offices of the "Red de Desarrollo Sostenible" (UNDP) at "Universidad Santa Maria la Antigua". That program is in the process of increasing their data transmission capability on the Internet with the near future installation of a wider band, and the future purchase of a Pentium III, 128 MB,10 GB and possibly 700MHz server.

It is suggested that CICH procure software packages for word processing, spreadsheet, and dBase IV to use as data storage, because of its format and ease in access by the Arc Systems, and its query and programming ease for various operating needs.

Data Access and Transfer Options

Since the CICH is not as yet fully operational and assuming a period of time will pass while it evolves into a fully functional institution there is insufficient information to suggest the most viable solution to define the database and to share and transfer data between members of the CICH constituent members and third parties.

There is a need to determine a structure for access to data in the Center. In principle there should be open access to data, although there may need to be a charge for some data because of licensing fees or to cover operating costs. One alternative would be to make it participatory with each data source/user agreeing to contribute roughly in proportion to what the user is extracting from the data archive. A second alternative is a cost-center whereby the Center acquires data and makes it available to non-CICH users on a cost of processing basis; a variation of this alternative is a profit center which has a revenue-generating function in addition to the recovery of the costs of data acquisition. It is recommended that a cost center be pursued initially; later if there is a clear opportunity and need to generate revenue that can be implemented on top of cost recovery. Furthermore, it is recommended that some importance be given to the creation of a technical advisory committee where inter-agency problems might be discussed outside political illumination.

Whatever the structure of the Center, different levels of access may be required. CICH members will all have some degree of access, but even they may not have access to all files obtained from all sources. It is recommended that there be a users advisory committee composed of selected CICH members and outside users for providing the CICH and its staff guidance in determining the different levels of access and criteria for the different levels. This committee should be expected to deal with the problems outlined in Conclusion No. 7.

The task of transferring data between institutions could be a simple operation at first. By recording data in CD’s they can easily be transported between

institutions. A catalog of available data should be published by the CICH Center when the data are residing in their facilities to acquaint possible users with the information available for their use.

The future option for such data transfers should be the Internet. This should be pursued as quickly as possible. The “Red de Desarrollo Sostenible” will be able to provide an Internet data transmission solution in the near future that could be available to CICH when CICH is ready and able to functionally serve the needs of its members. Follow-up activities in this field might have to explore the use of this service-provider as there is an issue that can prove politically sensitive. The issue is that the use of “Red” for internet transmissions, using their software facilities, could require that the data in the CICH Center would have a “Mirror” database at the “Red’s” server, since they would provide an interface to process data in any format to make it available to users and to update files only when a change has been made to the database residing at the CICH. The advantage of such an arrangement is that if the CICH hardware/software should have a “crash” there is always a complete mirror database at the “Red”. Any contractual arrangement with this provider would have to be very specific to allay fears of data misuse or dissemination at the CICH and/or the Government of Panama.

Another data sharing option is to provide access through the Internet connections at all CICH’s constituent member facilities. Of course this option would require Internet software connections at each site. The advantage of this solution is the current knowledge that the intermittent data transmission, although it is slow because of file sizes, will not affect operations or service, since data use does not have to be instantaneous and everybody can wait until the information is available. The assumption for the previous statements is that transmission can last several hours because of its massiveness, but users can wait for information that was not created at the last minute, but data that in some instances is several years old. Another assumption is that the volume of requests for data is not going to have peaks but that will be slow and intermittent.

Conclusions

The following conclusions have been derived from interviews with agencies and organizations having both geo-spatial data and a responsibility for the care of the Panama Canal Watershed.

There is an abundance of data available in Panama for meeting the needs of the CICH. However, much of the data are not well documented (lacks metadata).

There are significant gaps in the data, both because of relative inaccessibility and a total lack of some types of data. This is illustrated by the lack of ready accessibility to census data; on the other hand, there are no data on sewage systems in the heavily urbanizing area between Colon and Panama.

Special attention must be paid to the role of *Envista* development at ANAM.

The data management system must consider the potential involvement of non-governmental organizations like ANCON and private sector enterprises like GeoInfo. The latter is in the business of marketing digital geo-spatial data and thus a major concern is that any data sales or licenses be restricted to non-commercial purposes.

Several organizations visited that are not part of CICH could become clients, like Sondear; service providers, like the "Red de Desarrollo Sostenible"; or partners with the CICH, like the Contraloria.

There is a need for greater support of the work of the National Geographic Institute "Tomy Guardia". Its budget is woefully inadequate for the important work that it currently has, namely the digital conversion of its national archive of topographic base maps, maintenance of the nation's geodetic control network, and the training in the use of GIS and related software (remote sensing, GPS) for which the ING has merited some well deserved praise. It is recommended that "Tommy Guardia" be given a prominent observer, if not participatory, role in any CICH committee set up to provide technical advice to the Center.

After gathering data and considering available hardware capability in Panama through visits and demonstrations by various vendors it was decided to recommend to the CICH decision makers that they procure hardware and software configurations based on the criteria developed during this assignment (see Annex B). Preliminary quotations have been obtained.

Annex A

Agencies and Personnel Contacted

We would like thank the people listed below for their cooperation and support during this preliminary assessment of a data management system for the EIC of the CICH:.

Lic. Raúl E. Martinez, ACP
Ing. Marcelo de la Rosa, Monitoreo 2000 (Louis Berger)
Ing. Roberto Ibañez, Monitoreo 2000 (Louis Berger)
Ing. Jaime Johnson, ANAM
Ing. Juan de Dios Castillo, ANAM
Sra. Dilia Santamaría, ANCON
Lic. Osvaldo A. Sánchez, ARI
Lic. Iliana Mora, ARI
Ing. Denis Fuentes, Instituto Geográfico Nacional "Tommy Guardia"
Sra. Bianca Cedeño, Instituto Geográfico Nacional "Tommy Guardia"
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Sra. Dalys de Guevara, MIVI
Sr. Antonio Armas, MIDA
Sr. Carlos Justo Córdoba, MIDA
Dr. Julio Calderón, UNDP
Lic. Bienvenido Castillo, ANAM
Sr. Arismendes Montoya, STRI/ANAM
Lic. José Agustín Espino, Sondear (Technoserve)
Mr. Ricardo Sierra, MOP
Mons. Laureano Crestar Durán, Cáritas Arquidiocesana
Sra. Esther Kwai Ben, Cáritas Arquidiocesana
Ing. Oscar M. McKay, Fundación Natura
Sra. Melva E. de Pimento, Fundación Natura
Lic. Luis Enrique Quesada, Contraloría General de la República
Sr. Omar Sánchez, Contraloría General de la República
Sra. Vaney Martínez, Red de Desarrollo Sostenible (UNDP originally)
Sr. Martín González, Envista Technologies
Sr. Cameron Rizos, Clifton Associates, Inc.
Sr. Daniel McClarty, Clifton Associates, Inc.
Sr. René A. Bonilla, Geoinfo, S.A.

Sra. Audrey Tapia, MULTITEK
Sra. Lee Roussel, USAID
Sr. Felipe Frederick, USAID
Dr. Devin Reese, USAID
Sr. Hal Cardwell, USAID

Annex B

Preliminary Specifications for Geographic Information System and Data Management Components

Below are described criteria (and/or assumptions) to guide components of the CICH´s Environmental Information Center. They are followed by a brief section that describes the assumptions have been made about what is *not* conceived to be considered part of the system. These criteria have been developed with GIS mainly in mind but some of the criteria extend to non-geospatial data as well.

Criteria for Systems Components Introduction

The following are criteria for the purpose of assessing the relative advantage/disadvantage of specific proposals. As a GIS depends upon the linking of hardware, software, data (data that has been georeferenced), and human beings, there will be at least one set of criteria to guide each of them. The sets of criteria are understood to be for relative assessment, not absolute. They are also a minimal set; other criteria may need to be added as needed. They should also be considered in each case to be satisfied "to the greatest extent possible" and/or "within budgetary or political constraints".

Criteria for Computer Hardware (to support GIS only)

- CPU speed – not less than 400 MHz.
- RAM – 128 KB minimum, 256 KB preferred.
- Hard Drive/Other Peripheral Mass Data Storage – 20 GB preferred.
- Monitor Quality and Size – 27" preferred, 21" minimum.

Criteria for Computer Software (to support GIS only)

- Be stand-alone (not through a higher level system such as Envista, for example).
- Compatibility with other ESRI-based GIS in Panama (not Intergraph) Includes spreadsheet, word processing, and DBMS software.
- Capable of both vector and grid processing.
- All GIS software to be acquired shall have been developed by ESRI (ARC/INFO, pc ARC/INFO, Arc CAD, Arc View, Spatial Analyst, 3D Analyst, etc.).
- All software should be capable of interfacing with other DBMS and convertible to dBase III or IV format. DBMS software should have capability at SQL Level 4.
- Run under Windows 98, NT or 2000 (but not Windows 3.1 or 95).
- Include DBMS, spreadsheet and word processing

Criteria for Computer Personnel (to support GIS only)

- Personnel should be trained in GIS and in GIS software developed by ESRI, the developers of ARC/INFO, Arc View, and other industry-standard software.
- Personnel should have experience in Panama and preferably be bilingual Spanish (native) and English (second language).
- Personnel should be acquainted with the environmental problems of the Panama Canal Watershed and with data sets that have been developed to cope with them.

Criteria for Data Sets (to support GIS only)

- The data set must be either essential or clearly potentially useful to the CICH in the foreseeable future for monitoring the environmental quality of the Watershed.
- The data set should be directly importable using only the supported GIS software. They should be acquired already clipped to the boundary of the extended Watershed. If not already clipped they should be reducible to the limits of the extended Canal Watershed using only in-house software (Arc View).

- Acquiring the data set should occasion no license or other user fee. (This means that any and all data to be acquired from any source must not have any fee limitations on its use by the CICH.)

- Data sets (and databases) to be acquired should be accompanied by metadata documentation.

What the System Will Not Include

- At least three of the participants in CICH have significant geospatial data processing capability (ARC/INFO, ERDAS, AutoCAD, etc.); they are ACP, ANAM, and ARI. (In addition, though MIVI has a limited GIS capability it has not developed any geospatial database of its own other than zoning maps. Other entities may have a similar situation.) Two of these agencies have significant remote sensing (RS) processing capability (ACP and ANAM both have ERDAS and/or ARC/INFO GRID) while the third (ARI) is considering the purchase of RS software (ER Mapper). Given this degree of RS capability in three major CICH participants and given the investment in equipment and personnel required for RS processing, along with a significant and concomitant training in its use, the consultants assume that the Environmental Information Center of the CICH will have no RS processing capability of its own and instead will rely on classified (not raw satellite imagery) data products from those participating agencies.

  This restriction reflects the financial reality of cost of processing in terms of equipment, time, and human resources.

What the System May Include Beyond Data

In addition to geospatial data and other tabular data, either in databases or data sets in tabular format, there may be other information in non-digital format that may be essential or desirable. Here we are considering legal information, permits, photographs (not aerial photographs), sketches, etc. This type of information can be very useful and although it may not be in digital format (and thus capable of being immediately computerized) it may be scanable for incorporation into the computer system.

Annex C

Glossary

ArcInfo and ArcView	GIS software developed by ESRI. ArcInfo works on Windows NT and Unix platforms. ArcView can operate on Windows 95/98/2000.
Attribute	Data about an entity that enables a distinction among all the different records in the data table. If all the attributes of one or more records are identical, the only other distinguishing characteristic must be locational, i.e., the records are of similar things but in different places. ***Atributo***
Coverage	ARC/INFO (GIS) term to describe a map layer that usually, but not always is the data for a single entity such as roads. Other examples could be forested cover, streams, etc., an ARC/INFO coverage consists of the cartographic representation of the spatial locations, which, together with the tabular attribute data expresses the database contents of all the different records of the single entity, like roads. ***Cobertura,*** sometimes ***Capa***.
Data Dictionary	An annotated list of data available from an organization.
ESRI	Environmental Systems Research Institute, Inc. A major supplier of GIS software.
Geo-spatial Data	Data that have been geo-referenced. ***Datos geo-referenciados***
Geo-reference	The linkage between *where* something is in geographical space with *what* is located there. This statement implies a universal system of geographic coordinates for locating points in space. ***Geo-referenciar***.
GIS	Geographic Information System is frequently taken to mean the hardware and/or software that are needed to map geo-spatial data. Both hardware and software, while essential for that purpose, are insufficient. Data to be included in the GIS, and trained GIS technicians to manipulate the data and produce the desired products, are the additional necessary components. Taken together, they are the GIS. ***SIG***.

InterGraph Geomedia	An open platform GIS software suite developed by the Intergraph Corporation. Operates on a Windows NT platform.
LandSat	A common type of imagery obtained through the LandSat satellite.
Map Layer	A GIS term that refers to a specific type of data when it is presented I in a GIS format.
Metadata	Information about a data set that is usually taken to indicate the precision of measurements along with their initial scale, but also to document the custodial path of the data set … when it was collected, by whom and when, and who has responsibility for its maintenance. Sometimes also called a data dictionary. ***Metadatos***.
PMCC	Panama Canal Watershed Monitoring Project, now called Monitoring 2000. Financed by USAID.
Remote Sensing	Type of geo-spatial data obtained from airborne or satellite platforms. Would include large-area scene imagery like Landsat or more focused imagery like Ikonos, as well as precise aerial photos. It would also include different types of imagery like multi-spectral imagery and radar imagery. Usually requires special software and trained personnel for its use.

Appendix 6

Analysis Of Legal And Institutional Issues For The CICH

Executive Summary

Current Legal Basis

The complementing and competing interests associated with the Panama Canal Watershed (PCW) involve a broad range of public, private and non-governmental agendas. Current management of the PCW includes an assortment of overlapping laws and regulations, together with areas of responsibility that have yet to be addressed. The GOP to resolve these complexities has established the Inter-Institutional Commission (CICH) for coordinating management of the Watershed.

The general basis for the existence of the CICH is traced to Law 19 (June 11, 1997), which provides the Panama Canal Authority (ACP) with broad powers for the management of the PCW. Law 19 establishes the ACP as having ultimate authority of management of the PCW, and expressly provides for the creation of an inter-institutional coordinating entity. A more detailed legal foundation for the CICH exists in Acuerdo 16 (July 17, 1999), which traces its authority to the Board of Directors of the ACP. In Article 38 of Acuerdo 16, it expressly provides that "the objective of the CICH is to integrate efforts, initiatives, and resources for the conservation and management of the Panama Canal Watershed and to promote its sustainable use."

Article 39 of Acuerdo 16 establishes that the CICH is subject to the Administrator of the ACP, and identifies eight entities that will comprise the membership of the CICH, namely:

- Panama Canal Authority
- Ministry of Government and Justice
- Ministry of Housing

- Ministry of Agricultural Development
- The National Environmental Authority
- The Inter-Oceanic Region Authority
- Two representatives of the NGO community
    - Fundación Natura
    - Cáritas Arquidiocesana

Article 40 of Acuerdo 16 details five express functions for the CICH:

- To establish a coordinating mechanism among organizations active in the PCW
- To establish through the ACP a financial and administrative system
- To supervise programs, projects and policies needed for adequate management of the Watershed, to minimize potential negative effects
- To evaluate programs, projects and policies in the planning phase to resolve possible problems or duplications
- To establish an environmental information center for the PCW.

Further, it is provided that the CICH:

- has responsibility for coordinating and monitoring the projects that are implemented in the PCW
- can solicit and obtain through the ACP technical support and funding from national or international organizations
- will receive administrative support, from ACP, necessary for the CICH to comply with its functions.

Article 45 provides that the CICH will adopt its operational and functional structure for the approval of the Board of Directors of the ACP.

Policy and Legal Challenges

Given the current legal basis for establishing the CICH and the general definition of the objectives that the CICH is intended to accomplish, a number of policy and legal challenges become evident. These policy and legal issues impact the effectiveness of the CICH to fulfill its mandate, and generally fall into the following categories:

- Definition of specific roles and responsibilities of CICH members
- Private sector representation as an interested party
- Mechanism for resolution of conflicts or disputes
- Provision for exceptions, variances, waivers and general flexibility
- Means to resolve current legal conflicts, lack of detailed authority, or overlapping jurisdiction

Further, specific instances of conflict exist within the current legal framework. These instances of overlapping jurisdictional or conflicting authority are addressed in more detail later, but basically interfere with the ability of the CICH to effectively fulfill its mandate.

It is the conclusion of this initial investigation into the policy and legal needs of the CICH that a more formal policy dialogue should be established so as to reach a consensus that provides for the clearly defined role, with specific named responsibilities, for each member of the CICH. Further, legal technicalities such as overlapping jurisdiction and conflicting authority should be resolved through amendment of current law or regulation, or via the creation of express agreements between the conflicting interests of competing government agencies or interested parties.

From a broader policy approach, it is suggested that initial attention be given to establishing a policy dialogue among ACP and other CICH members in order to reach consensus on the specific duties and responsibilities related to:

- Managing current activities within the Watershed, and

- Establishing criteria with which to assess all proposed development activity within the Watershed.

As an evolutionary process, any specific duties and responsibilities identified from a policy dialogue among CICH members would subsequently be codified in some form. While new regulations would certainly carry the weight and authority of the rule of law, it is suggested that less formal mechanisms to accomplish the primary objective be considered. Accordingly, it is suggested that organizational by-laws or internal operating procedures for the CICH and Inter-Institutional Agreements among CICH members and ACP be evaluated as tools for ensuring interagency cooperation.

Finally, it is not uncommon for conflicts of law to appear in the initial efforts of ambitious Inter-Institutional coordination efforts. This instance is no exception. Rather than attempting to address such "Laguna Jurídica" with amended legislation, it is suggested that solutions to legal gaps be addressed via consensus within a policy dialogue process.

Legal Issues

Panamanian Context

At the outset, it is important to emphasize the distinctions between Civil Code, as currently exists as the legal system in former Spanish colonies such as Panama and Mexico, and the English Common Law legal system inherited by the United States from England. In Civil Code systems, the law is codified extensively and explicitly, and generally takes precedence over the jurisprudence, or case law, of the country or jurisdiction.

In Panama, a Civil Code legal system exists in which the language of the legal code takes precedence over the jurisprudence, or case law. Accordingly, the language of the laws and regulations carries great weight. This is in contrast to Common Law jurisdictions, such as the US, where legal codes exist, but which are subjugated and interpreted relative to the "common" events decided within the judiciary or court system, and which manifest as "case law". When a court in a Common Law jurisdiction, while considering the applicable legal language, makes a determination based on the facts of the situation that is contrary to the

written language of the law, this "case law" takes precedence over the language of the law.

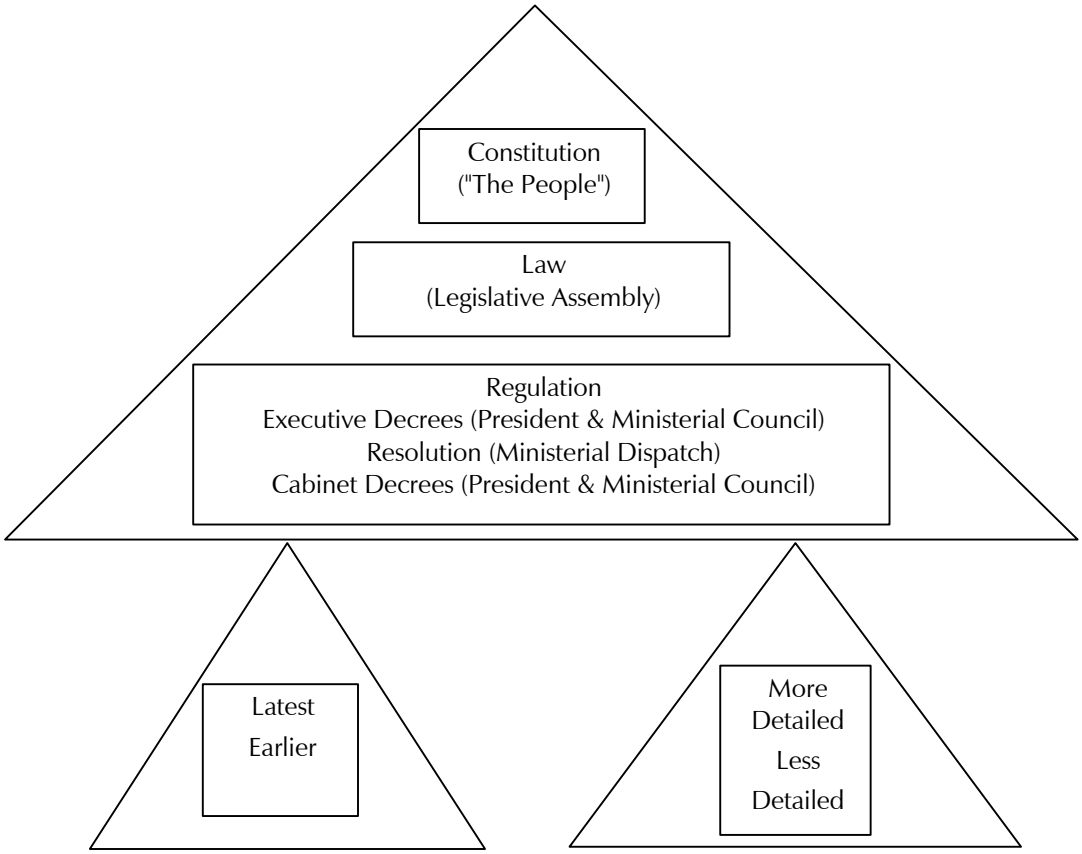
Accordingly, it will be important to evaluate the aims and objectives of the CICH from the view of what is expressly provided for in the implementing legislation. For, within the Civil Code system, the precise language provides for what will be the specific duties and authority of the legal entity.

Further, several other legal points relative to conflicts of law within a Civil Code legal system should be emphasized. Regarding conflicts between a law ("ley") and a regulation ("reglamento"), the law will be looked to as setting the scope and purpose of the legal system that should be reflected in the regulation. In other words, it is generally accepted that when there is a conflict between the language of a law and the language of a regulation, it is the law that will take precedence over the regulation.

Also within the Civil Code legal system, there exists the concept of the latest enacted law or regulation taking precedence over earlier versions. And also, that more detailed legal language or provisions will take precedence over those of more general language.

Finally, it should be noted that the national Constitution, understood to have been manifested by "the people", will take precedence over either law or regulation.

Figure 1 Hierarchy of Law Civil Code System



Summary of Applicable Laws

Amendment to the Political Constitution of the Republic of Panama, Title XIV; The Panama Canal; June 11, 1997.

This amendment to the Panamanian Constitution provides broad authority to the Panama Canal Authority (ACP) for the exclusive control and management, in coordination with other appropriate agencies, of the Panama Canal.

Law 5; Creation of the Authority of the Interoceanic Region (ARI); February 25, 1995.

The Authority of the Interoceanic Region (ARI) is created and tasked with the development of a Regional Plan to dispossess the physical assets of the Panama Canal while providing that the Watershed is conserved and protected, specifically ensuring an adequate water supply for drinking water and Canal operation.

Law 19; Organic Law of the Panama Canal Authority; June 11, 1997

Law 19 establishes and organizes the Panama Canal Authority for the administration and operation of the waterway, providing the necessary authority for managing the Canal, such as appointing a Board of Directors, establishing an Inter-Institutional coordinating commission and protecting the natural resources of the Watershed.

Law 21; Regional Plan for the Development of the Interoceanic Region, General Plan for the Use, Protection and Development of the Canal Zone; July 2, 1997.

Law 21 contains general proclamations which provide that the Regional Plan for the Development of the Interoceanic Region required to be developed by ARI under Law 5, and the General Plan for the Use, Conservation and Development of the Canal Area, have the effect of law as regulations.

Law 41; General Environmental Law of the Republic of Panama, National Environmental Authority (ANAM); July 1, 1998.

Law 41 establishes the basic principles and norms for the protection, conservation and recovery of the environment, and promoting sustainable development and use

of natural resources, and including specific authority over the water resources of the Canal Watershed.

Law 44; The Geographic Limits of the Watershed of the Panama Canal; August 31, 1999.

Law 44 basically establishes the physical geographic boundaries of the Canal Watershed, which has been expanded by 60% to a total area of 552,761 hectares.

Acuerdo 16; The Regulation for the Environment, Watershed and the Inter-Institutional Commission of the Canal Watershed; June 17, 1999.

This Regulation addresses the specific aspects of environmental protection in the Canal Watershed, and the establishment of an Inter-Institutional coordinating body for the Watershed.

Key Legal Provisions

Political Constitution of the Republic of Panama, Title XIV; The Panama Canal

Article 310.

- Autonomous legal entity, ACP, shall be exclusively in charge of the administration, operation, conservation, maintenance and modernization of the canal…

- ACP, in coordination with other Government agencies, shall be responsible for the administration, maintenance, use and conservation of the water resources of the … Watershed. Any plans for construction, the use of waters, and the utilization, expansion, and development of the ports, or any other work or construction along the banks of the Canal shall require the prior approval of ACP.

Article 317

- The regime contained in this Title may only be implemented by means of laws establishing general policies.

Law 5

a. Article 5

- ARI is to develop a General Plan to be submitted and approved by the Legislative Assembly; once approved, the General Plan is then adopted as the foundation of ARI's administrative functions.
- ARI must consult with and take into consideration the concerns of CICH members.
- ARI must ensure an adequate water supply for Potable water and Canal operation.

Article 6

- ARI cannot sell any land that is necessary for the protection of the water supply.

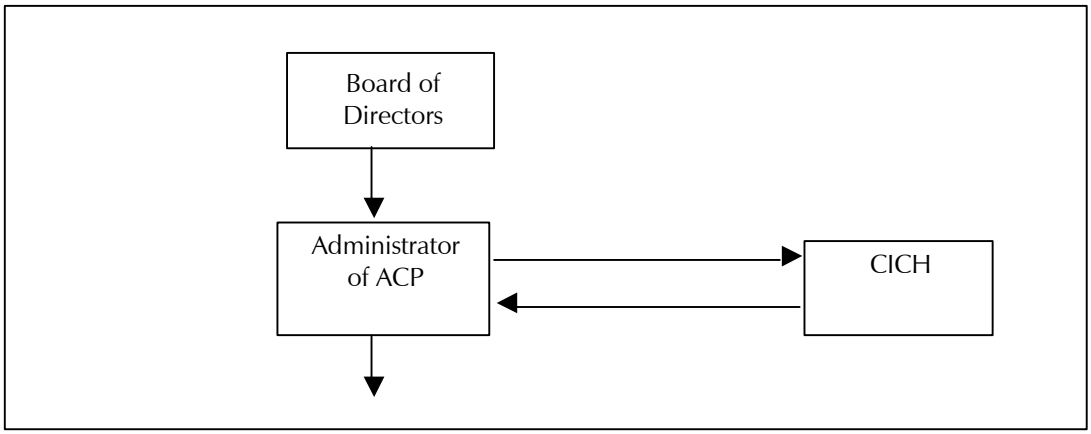
Law 19

Article 6

- ACP is responsible for the management, maintenance, use and conservation of the water resources of the Canal Watershed.
- to safeguard this resource, the ACP shall coordinate with the governmental authority and NGOs with responsibility for, and interest in, the natural resources of the Watershed, its management, preservation, and use of the natural resources, and shall approve the strategies, policies, program and projects, both public and private, that may affect the Watershed.
- The Board of Directors of the ACP shall appoint and regulate the CICH, which shall be coordinated and governed by the ACP to coordinate the activities of Governmental and non-governmental organizations.
- Board appoints members of CICH.
- Board develops regulations to implement Article 6 (i.e. establish regulations for CICH).
- The "CICH is coordinated by ACP" (see following diagram).

- This coordination will be determined according to the institutional role of each member.

Figure 2 Relationship of the CICH to the ACP



Chapter VII. Environment and Canal Watershed

Article 120.

Any regulation adopted by ACP concerning water resources, shall have, among others, the following purposes:

- to manage the water resources for the operation of the Canal and the supply of water for consumption by surrounding communities.
- to safeguard the natural resources of the Canal Watershed, for the purpose of preventing a reduction in the supply of water.

Article 121.

Regulations adopted by ACP shall consider, among other matters:

- protection, conservation and maintenance of water resources.
- protection, conservation, maintenance and improvement of the environment.
- clean up of Canal.

- supervision of quantity and quality of water in Watershed.
- assessment of the environmental impact of any projects and activities that might significantly impact the environment in interdisciplinary consultation with ACP.
- the coordination with Government authorities, … including those to whom the law confers authority to issue prohibitions and penalties concerning the use of water resources.
- the prevention and control of spills and hazardous substances to protect the environment and maintain the ecological balance of the natural resources within the Watershed, as well as its buffer zones and protected areas.

Chapter IX. Transitory Provisions

Article 131.

The public registry, at the request of the ACP, shall register all the lands and improvements thereon which are used for the operation of the Canal.

Law 21

Article 1

- Gives legal effect to ARI's Regional Plan

Law 41

Articles 80- 83

- provides ANAM with authority to manage water resources, including watersheds, and emphasizes the importance of water supply and water quality for the country.

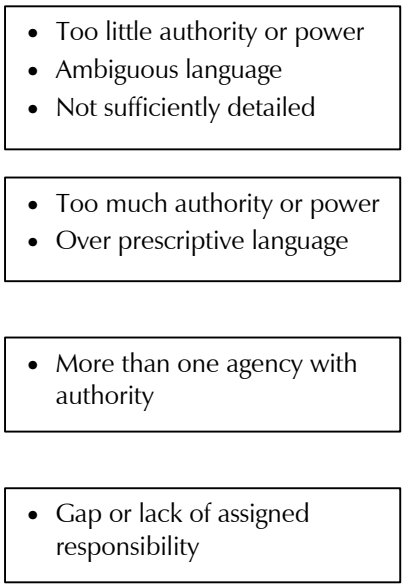
Article 84

- affirms the authority of ACP over the administration, use, maintenance and conservation of water resources of the Canal Watershed, and provides for ACP to coordinate with ANAM for the development of strategies, policies and programs for the sustainable management of the natural resources of the Watershed.

Legal Conflicts

Preliminary review of the laws and regulations reveal basic legal conflicts that arise as impediments to effective functioning of the CICH. In the Panamanian Civil Code system, this is referred to as “Laguna Jurídica”, and relates to a lack of clarity or specificity concerning delegated authority or jurisdiction.

Figure 3 Conflicts of Authority & Jurisdiction



Instances of conflict related to Authority generally occur when either too much or not enough power or authority has been delegated to an agency or other entity to fulfill the objective outlined or mandated in an enabling piece of legislation.

A conflict of Jurisdiction generally occurs when more than one agency or entity has authority over the same or similar duties, activities or responsibilities. Or, when specific duties have been assigned but without clear definition within the enabling legislation as to what agency is responsible for ensuring these duties are performed.

Finally, it is important to note that the Constitution of Panama explicitly states that a civil servant can do only exactly what the text of the law or regulation provides for, and nothing more. If a civil servant were to exercise authority beyond that which is explicitly provided for in a law, it would be a violation of

this constitutional decree, referred to as "ultra vires", or acting above or beyond one's delegated authority.

Gap Analysis

Following is a Gap Analysis of current legislative provisions and general legal language that pose impediments to the effective functioning of the CICH. These basically include legal aspects such as overlapping jurisdiction, duplicated authority or responsibility, a lack of specificity, or an overly prescribed listing of authority or duties that does not allow for unexpected or unforeseen circumstances.

Acuerdo 16

Article 8.

Article 8 of Acuerdo 16 provides the Administrator of ACP with the authority to obtain samples or specimens of flora and fauna, and general environmental samples, in coordination with other competent authorities. This is brought to attention in order to point out that the authority granted in Article 8 is significantly broader than the authority granted in Law 19, Article 25, and holds the potential for conflict between ACP and other entities due to overlapping jurisdiction and responsibilities.

Also, Article 25 of Law 19 provides for 20 enumerated administrative "functions and duties" of the Administrator. While Point 20 broadly grants authority for "any other function as assigned by this Law, the Regulations, or the Board of Directors", the specificity and subject matter of Article 8 of Acuerdo 16, particularly the sampling of flora and fauna, is inconsistent with the general administrative nature of the 20 "functions and duties" of Article 25 of Law 19.

Currently environmental sampling falls under the authority of ANAM. Further, the four National Parks of the Watershed are under the jurisdiction of ANAM, and there are other scientific research centers operating in the Watershed as well, such as the Smithsonian. While it is not suggested that ACP should not have authority for environmental sampling, it is recommended that some understanding, however informal, should be reached between ACP and those entities with environmental sampling responsibilities in the Watershed (ANAM, Smithsonian), so as to avoid

instances of duplicating efforts. This may take the form of an "Acuerdo" or Inter-Institutional Agreement between ACP and ANAM.

Article 15

Article 15 of Acuerdo 16 states that ACP "may" consider the environmental impact studies for projects or activities proposed in the Watershed. This poses another point of possible conflict and inconsistency with Article 121, Point 5 of Law 19, which states that ACP "shall consider" the environmental impact of any projects and activity. This conflict of imperative language should be resolved within a formal policy dialogue among CICH members.

(Obviously, all considerations of environmental impact studies must be coordinated with ANAM.)

Article 18

Article 18 of Acuerdo 16 provides the ACP with the authority to establish the legal mechanisms for extraction or utilization of water resources. This poses a conflict with other agencies that already possess authority or responsibility over the extraction or utilization of water resources, namely ANAM and IDAAN. Further, while Article 18 only applies to water resources, it should be noted that permission for the extraction or utilization of other natural resources, namely timber, mining and fishing, has been delegated to other Agencies (Law 35, 1966; Law 41 1998) and already occurs within the Watershed. This issue should be addressed in a formal policy dialogue among all CICH members and an agreement as to clear roles and duties of interested or responsible agencies should be codified in an "acuerdo" or Inter-Institutional Agreement.

Article 38

Article 38 of Acuerdo 16 states that CICH will function as an "adscrito" entity of the ACP, implying a very formal relationship between CICH and ACP, to the degree that CICH is to operate as an actual part, or agent, of ACP. This stands in contrast to Article 6 of Law 19 which grants authority to ACP to appoint and regulate the CICH, and which states only that the CICH will be "coordinated and governed" by ACP. Accordingly, in order to make the Acuerdo consistent with the law, it is recommended that the reference to "adscrito" be removed, with the

language of the Acuerdo amended to more accurately reflect the language and intent of Article 6 of Law 19.

Article 39

Article 39 of Acuerdo 16 establishes the composition of the CICH, and states that besides the ACP, the CICH will be comprised of seven (7) entities, namely, the Ministry of Government and Justice, MIVI, MIDA, ANAM, ARI and two (2) NGOs. The point is that with such explicit language, there is no provision for the inclusion of other governmental entities on the CICH. It is likely that other governmental entities may have a legitimate interest in participating in the CICH. Further, it is quite certain that other government entities not expressly listed in Article 39 at some point will have an interest in the Watershed as it relates to the subject matter and jurisdiction of that government entity. Examples would include the Ministry of Commerce and Industry (MICI), Ministry of Health, Ministry of Economics and Finance, and the Ministry of Public Works (Obras Públicas).

While the CICH is required to coordinate with all parties that have an interest in the Watershed, consideration should be given to a more structured mechanism for inclusion of other governmental or non-governmental entities. Accordingly, it is recommended that consideration be given to the addition of language that provides for some form of more formal participation such as an Ad-Hoc committee or temporary membership to the CICH, as may be required to address a particular situation. Further, consideration needs to be given to a system or program that allows for formal inclusion of private sector representation or participation in the decision-making process of watershed management.

Article 40

As in the case of Article 39, Article 40 of Acuerdo 16 sets out explicit specific duties of the CICH. The challenge of such explicit language is that it does not allow for consideration of other duties that may be required beyond those explicitly outlined. It is common for regulations granting authority to governmental entities to include an "omnibus" clause. An "omnibus" clause uses language that grants authority to the entity (in this case, the CICH) to take whatever action may be appropriate or necessary to accomplish a required task, but which authority may not have been explicitly provided for in the explicit language of the Article.

Accordingly, it is recommended that consideration be given to the inclusion of an "omnibus" clause that would allow the CICH the discretionary authority to fulfill any and all obligations within its purview in a manner consistent with the overall objective of the ACP. Thus, the introduction of flexibility would be the objective here, and could be achieved quite easily.

Article 43

Article 43 of Acuerdo 16 provides that the CICH will be subject to the fiscal controls and procedures of the ACP. It is important to note that the fiscal term of the ACP is triennial, while the member organizations of the CICH are on annual fiscal terms. Accordingly, the possibility for conflict given these different fiscal terms, particularly in the budgeting or administrative process, should be addressed.

Law 19

A basic question about the legitimacy of the authority granted to ACP within Law 19 exists when a comparison and analysis of the Articles of Law 19 is made with the Political Constitution of the Republic of Panama, Title XIV, The Panama Canal, particularly, article 310. Basically, some of the authority and a number of duties granted in the articles of Law 19 go significantly beyond the authority explicitly mandated in the Constitution.

Also, Article 310 of the Constitution states in pertinent part, that the ACP "shall be exclusively in charge of the administration, operation, conservation, maintenance, and modernization of the Panama Canal…". The delegation of this authority again begs the question regarding whether this exclusive authority is impinged upon through the inclusion of an entity such as the CICH, which plays a significant role in the development of strategies, policies and regulations. After discussing this issue within the context of a formal policy dialogue, and if the ACP or other CICH members feel that this is a significant issue, it is recommended that a formal statement from an appropriate legal authority such as a senior court, be obtained to officially clarify the authority of the CICH vis-à-vis the ACP.

Article 6

Article 6 of Law 19 explicitly provides that the ACP shall coordinate with both governmental agencies and non-governmental organizations in issues related to natural resources of the Watershed. This is in contrast with Article 310 of the Constitution, which only provides for the ACP to coordinate with other government agencies, with no reference to non-governmental organizations. It should be clarified among ACP and CICH members that it is within the express authority of the CICH to coordinate with NGOs.

Article 121 and 120.

Point 4 of Article 121 of Law 19 explicitly states that the regulations adopted by ACP shall consider the "quantity and quality" of water. However, in the Article immediately prior, Article 120, Point 1 and 2 state that the specific purposes of the regulations adopted by ACP are to include (1) the management of water resources for canal operation and drinking water supply, and (2) to safeguard natural resources in order to maintain an adequate water supply for the purposes of canal operations and drinking water.

Note that explicit reference is made to the "supply" of water, inferring an adequate or appropriate quantity or volume of water to be maintained. Reference to maintaining the water and natural resources for the purpose of drinking water implies a specific "quality" of water, namely a level of quality sufficient of potable or drinkable water. Accordingly, for purposes of clarity, and to underscore the important social, health, as well as economic implications of maintaining a quality drinking water supply, it is recommended that consideration be given to either amending Article 120 to specifically include the words "quality" and "quantity" of the water, or include language that charges the CICH with a mandate of maintaining the "quality" and "quantity" of water resources.

Table 1 Chart of Current Legal Conflicts

Legal Provision	In Conflict With	Legal Issue	Subject Matter
Acuerdo 16, Article 8	Law 19, Article 25 (20)	Overlapping jurisdiction	Multiple authority for environmental sampling
Acuerdo 16, Article 15	Law 19, Article 121 (5)	Conflict of authority ("may" v. "shall")	When EIAs should be considered
Acuerdo 16, Article 18	Law 35 and Law 41	Overlapping jurisdiction and Authority Conflict	Water use rights
Acuerdo 16, Article 38	Law 19, Article 6	Authority Conflict	Status of CICH as "adscrito" as "coordinated and governed" by ACP
Acuerdo 16, Article 39	Itself	Gap	Inclusion of other governmental entities in the CICH
Acuerdo 16, Article 40	Itself	Gap	Need for additional CICH duties (e.g. negotiation, arbitrate conflicts)
Acuerdo 16, Article 43	Itself	Administrative Conflict	ACP fiscal term: 3 years; Other Government entities: 1 year
Law 19, Article 6	Constitution, Article 310	Authority Conflict	ACP coordination with NGOs

Key Resource Use Issues

In order to effectively fulfill its mandate of interagency coordination for purposes of managing the Panama Canal Watershed, a primary objective of the CICH is the need to coordinate and address conflicting and divergent development activities that will likely occur within the Watershed, especially those that have an impact on water quantity and quality. For example, the CICH will need to adequately address such divergent issues as:

- private sector investment and development
- urbanization impacts related to housing, basic sanitation, schools, healthcare, public works and public safety, etc.
- agricultural development such as farming or livestock raising
- tourist facilities and related activities
- the management and support services for national parks

Water Resource Issues

In addition to the legal conflicts with respect to water resources identified in the previous section, MIVI and IDAAN also play roles related to water use. This section briefly examines the role that each plays and the need for CICH to collaborate with both organizations.

MIVI. The Ministry of Housing

The Ministry of Housing plays a major role in the urbanization process. It has as a principal function the design and implementation of urban development and housing plans approved by the government. It also coordinates and implements national policies in these areas.

Law 21 explicitly addresses the topic of orderly and coherent growth of the urban and rural areas within the land use plan for the Panama Canal Watershed, especially those areas that correspond to the metropolitan areas of Panama and Colon. Article 5 of Law 21 specifies that the land use plan will serve as the basis for detailed zoning, which is MIVI's responsibility, related to urban development. Article 13 of the same law gives MIVI (and no other institution) the ability to join with ARI to propose variation, through legislation, to the land use categories contained in the Regional Plan and the General Plan.

In 1998 the Council of Ministers approved the "Plan for Urban Development of the Pacific and Atlantic Metropolitan areas" contained in Resolution 159 that sought to strengthen MIVI's capacity to plan and regulate urban development including areas within the Canal Watershed. The implementation of this Plan, which is viewed to be long term, should be considered as a special topic to be dealt with by the CICH.

It is necessary to improve the performance of MIVI within the Watershed because of the issues of sewerage and solid waste in areas of urban development. These issues constitute a situation of risk that will need to be addressed by the CICH since it is certain that urban growth within the Watershed will result in an increase in contaminants whose final destination will be the soil and waters of the Watershed. This is especially true for those urbanizing areas that are far from urban sewerage and waste collection systems.

Under Article 44 of Law 5 of 1993, MIVI, together with the National Mortgage Bank (Banco Hipotecario Nacional), has been given the responsibility of managing a special regime of expropriation of certain lands within the Watershed.

El Instituto de Acueductos y Alcantarillados Nacionales (IDAAN)

IDAAN, the National Water and Sewerage Institute, was created in 1961 to provide potable water and sanitation systems to all communities larger than 2,500 inhabitants.

Within the Watershed IDAAN plays the role of a water user because it manages the Chilibre and Sabanitas water treatment plants which are supplied from lakes Alhajuela and Gatun respectively. It also purchases water from the Miraflores water treatment plant for Panama City. It is also the organization primarily responsible for the sewerage systems in all of the urban and semi-urban areas within the Canal Watershed.

Therefore, IDAAN needs to be considered in the CICH policies both as a resource user and an actor within the Watershed. The role of IDAAN will increase as population growth and urban development increase along the transisthmian axis and other zones that may be permitted by the Regional Plan.

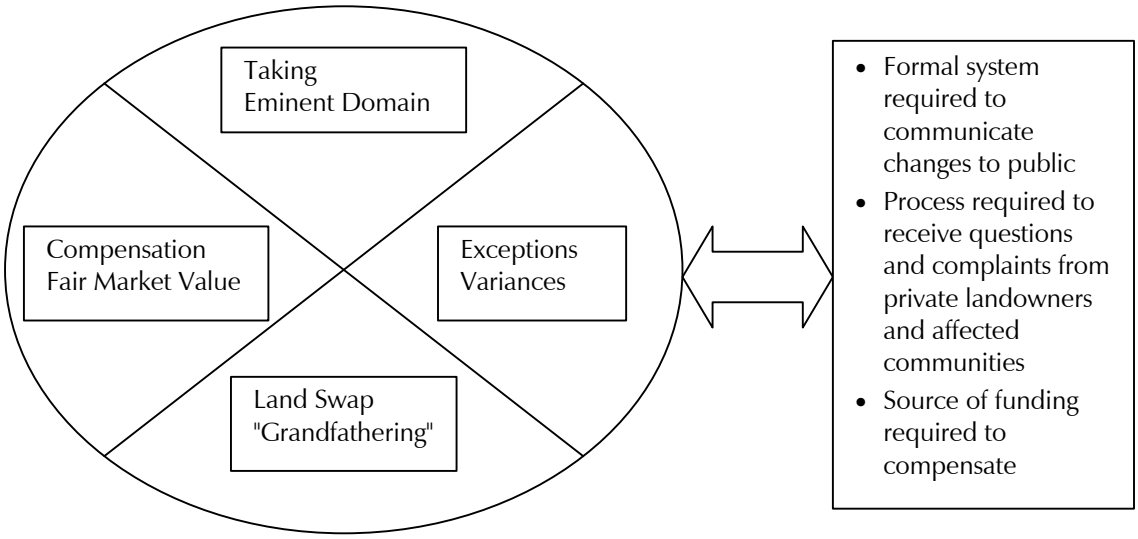
The principal problem that faces IDAAN is its limited technical capacity to control the wastewater so that it does not contaminate the Watershed.

Land Resource Issues

Under the current land use designations, and given the greatly expanded area now included in the Watershed, a significant amount of land usage will likely be inconsistent with Watershed classifications such as "protected forest", "agricultural", and "urban", etc.

Further, private land ownership will likely pose a future problem from inconsistent use with watershed classifications. For example, at that point in time when a private land owner seeks permission to construct and operate a factory on his private land within an area that is classified as "agricultural", or some other use inconsistent with new land use classifications.

Figure 4 Legal Land Use Issues



A fundamental legal policy question that needs to be addressed is whether private landowners would view the change of land use delegation as restrictive to the point of a "taking"? Does the change in land use classifications actually imply an act on the part of the State that is equal to a "taking" by the State, and would the State maintain that this occurred as a matter of Eminent Domain? A primary issue to be addressed by the CICH should be clarification of official law and policy for such instances. A formal system is needed for communicating between the government and members of the public regarding questions and grievances from private property holders that may have been negatively effected by a government "taking" due to a change in land use status.

Further, the issue will need to be addressed as to whether there has been a decrease in the economic value of the property due to the change in land use classification. In the event that a landowner is prohibited from developing his land in the manner offering the highest economic return, the methodology for determining and providing compensation for loss of value must be addressed. This may require the establishment of a compensation fund or scheme. This would need to include the financial methodology for assessing Fair Market Value.

Consideration should be given to the application of a "Land Swap" system whereby private land determined to be inconsistent with new land use designations would be exchanged for land of equal or greater value in a land use designation consistent with the desired use of the private landowner.

Consideration should also be given to "grandfathering" current inconsistent uses to allow for the continued current use of land, even if inconsistent with land use designations. This would require the appropriate authorities to simply manage the negative impacts from current inconsistent uses. It may also be imperative to address the need to make "exceptions" for inconsistent land use for the duration of the life of the titled landowner, whereby a "life tenancy" in the property is granted for the life of the landowner.

Another policy or legal approach for consideration is the applicability of an officially declared moratorium on new development that is inconsistent with the new land use classification, or any new or expanded change in current land use operations.

Generally, the need exists for overall policy, with the development of subsequent guidelines - though not necessarily in the form of "regulations" - to direct the activities of the CICH as it relates to ACP decisions or actions within the Watershed, related to each land use category.

In light of the above-identified scenarios, it is recommended that the CICH undertake a study of land use issues, with the identification of specific legal solutions. A suggested strategy to address these issues includes the following steps:

- undertake an inventory of current inconsistent uses or activities within each land use classification within the Watershed;
- undertake an inventory of private land holdings that could pose the risk of inconsistent use with land use classifications within the Watershed;
- undertake an inventory of all Environmental Impact Assessments (EIA) completed within the Watershed, including the expanded areas not originally part of the Watershed, and assess both those approved and disapproved.

Table 2 Land Use Jurisdiction Conflicts

Land Use / Agency	MINGO	MIVI	MIDA	ANAM	ARI*	ACP	IPAT#	MICI#
Protected forest				X	X	X		
Agriculture			X		X			
Urban		X		X	X			X
Canal operation					X	X		
Tourism				X	X		X	
Large projects/mining				X	X			X
Temporary use			X		X			
Limited & Restricted use					X	X		

* ARI has the responsibility to address all land uses with the Regional Plan

IPAT and MICI are not part of the CICH

Conflict Resolution

It is important that the CICH have a well conceived strategy for resolving legal and other conflicts among its constituent member as well as with outside parties. This section discusses the potential use of Alternative Dispute Resolution mechanisms that may offer informal means of conflict resolution and then lays out the Panamanian legal framework for conflict resolution involving Panamanian governmental entities.

In discussing conflict resolution it is useful to recognize that there are three independent fundamental factors that affect the resolution of disputes and therefore need to be considered by the CICH:

- Interests: are defined by a party in an interaction and are the things that that party is interested in (money, recognition, physical goods, etc.).
- Power: is given by a combination of external circumstances and self-confidence.
- Rights: are given by an external framework, for example national laws or contracts between parties.

Alternative Dispute Resolution (ADR)

Reference is made to consideration of Alternative Dispute Resolution (ADR) under the section on Inter-Institutional Agreements below, ADR is a method by

which conflicts and disputes among parties are resolved. It is used extensively in countries such as the U.S. Further, ADR may be applicable as a method of resolving disputes related to conflicts over management of the Watershed by other entities or members of the public that are not formally represented within the CICH, The most promising ADR mechanism is mediation (the concepts of arbitration and "mini-trials" that are used in the U.S. appear less feasible in disputes involving Panamanian governmental entities). Mediation is a popular form of ADR. It is a process of dispute resolution focused on effective communication and negotiation skills. The mediator acts as a facilitator assisting the parties in communicating and negotiating more effectively, thereby enhancing their ability to reach a settlement. It is not the mediator's role to adjudicate the issues in dispute and indeed the mediator has no authority to do so.

Mediation is not a process to force compromise, although compromise is an element of the process. Each party's limitations are respected and a party is only expected to make a shift in its approach to the problem if it becomes convinced that it is reasonable to do so.

Today, mediation is the most rapidly growing form of ADR. It is being actively utilized in almost every conceivable type of dispute resolution and comes in various forms. The process has also been effectively adapted for multiple party dispute resolution with tremendous success. On average, the success rates of mediation processes range from 80% to 85%. In an attempt to capitalize on the success rates, legislation in many jurisdictions, particularly in the U.S., is slowly being amended to include provisions for mediation of disputes.

The advantages of mediation include:

- **Effective Process:** Mediation generally enjoys an 80%-85% success rate.
- **Better Results:** The resolution is created by the parties so that it works for them.
- **Speed:** Mediation is focused in resolving the problem quickly.
- **Cost:** Mediation is not expensive.

Legal alternatives to resolve conflicts among members of the CICH that result from conflicting authorities and as a result of project and program implementation.

The participation on the CICH of different public institutions with different organic laws and with the possibility that they may develop similar types of activities within the Canal Watershed creates the potential for conflicts among them. Within this context the CICH can play a determining role if, within its operating procedures, it is has the ability to mediate and filter, through consultation and prior agreement, such activities in order to avoid duplication of programs and the resulting waste of resources and effort. This approach does not cause problems if we depart from the principal that the CICH is constituted more as a product of consensus among its participating institutions than as a directive of the ACP Board of Directors.

In the event that a conflict between institutions arises because of real conflicting responsibilities contained in the organic Laws and, as a result, the institutions involved, feel that they are not able to renounce their legal responsibility, then the only alternative is to take the dispute to the "Sala Tercera" of the Supreme Court for its ruling. In this case, the Party that considers that it is supported by the Law can file a brief known as "Contencioso de Interpretación y Validez", in which case, the verdict of the Sala Tercera is final and mandatory.

The affected institution can also file a "demanda contenciosa – administrativa de Nulidad" with the intent that the activity in question be declared null. This process has not been used except between Municipalities and the Central Government (because of the autonomy of the Municipalities).

Finally, there is the option of consulting the Procuraduría de la Administración about the conflict, but with the understanding that its ruling is not binding.

Under Panamanian law it is possible to use Arbitration to resolve inter-institutional conflicts by Article 1413 of the Judicial Code in instances involving autonomous public institutions (ministries do not qualify) provided that it is used in situations in which the State has acted as a private party and the conflict is with non-public parties.

Conclusion

A major policy consideration for the CICH is the need to include ADR mechanisms such as mediation as a means to resolve both conflicts among members of the CICH, as well as a more permanent option for resolution of conflicts between the public and the CICH. ADR should be considered as an

effective and efficient means for resolving such conflicts. However, it is important to note that ADR is not intended to replace litigation. Even the strongest proponents of ADR agree that certain matters must be resolved through the courts according to the processes outlined above.

Inter-Institutional Agreements

Based on discussions with the local environmental attorney and the legal personnel of various government and legal entities, together with an assessment of the current Panamanian legislation, it is believed that a role exists for the use of Inter-Institutional Agreements (IAs) in facilitating action and coordination between ACP and the member organizations of the CICH.

Further, given the legal structure of the Panamanian Civil Code system, IAs, which take the form of an "Acuerdo" appear to pose an effective means to enter into inter-institutional initiatives without requiring a specific piece of legislation be enacted or amended to detail such action or coordination. As mentioned previously in the section on Conflicts of Law, the Panamanian Constitution expressly provides that a Civil Servant shall not take any action other than that which is expressly provided for in the text of the law or regulation. Accordingly, a role evolves for the Acuerdo for clarifying or specifying cooperative action, including required action between government Ministries or Institutions.

The process for developing IAs also affords the opportunity to further the policy dialogue among the various members of the CICH. Thus, the initial assessment of IAs should take place within the context of any initial policy dialogue among ACP and CICH members regarding implementation of the Regional Plan.

Note that IAs could play a role in addressing conflicts of law, overlapping jurisdiction or legislative gaps. IAs, for example, could provide for explicit assignment of tasks or responsibilities, such as the implementation of the Regional Plan, or the review of Environmental Impact Assessments. Further, IAs can include provisions that allow for effective interagency coordination, such as the inclusion of language that provides for resolving conflicts via mediation or arbitration.

It is recommended that a specific element to be addressed is the need for the CICH to have some system to address and resolve conflict, such as mediation or arbitration. This could include the adoption of a formal process based on accepted

national or international arbitration or dispute resolution standards for business conflict. Alternatively, it could be a more informal process among CICH members, with overall and final authority resting with ACP.

It is recommended that an evaluation of the efficacy of "bilateral" IAs versus "multilateral" IAs be undertaken. That is, this project should assess whether the CICH would be more effective in fulfilling its obligations with individual IAs executed between ACP and each CICH member, or with a single IA executed between ACP and the CICH as an individual entity.

In summary, IAs should be evaluated in light of the following points:

- as an element of the policy dialogue among ACP and CICH members
- to address conflicts of law such as gaps or overlapping jurisdiction
- as an effective means to identify and commit to required action among the responsible agencies
- as an alternative to amending existing law or passing new regulations
- as a means to establish a formal or informal system of dispute resolution
- evaluate the efficacy of "bilateral" versus "multilateral" IAs

Structure of the CICH

Needs and Recommendations

- Given the mandate of the CICH to coordinate among various organizations with diverse expertise, it is recommended that a Technical Advisory Council for the CICH be considered to advise on technical matters regarding natural resources. For example, monitoring, record keeping, reporting, land use, environmental performance standards, programs and projects.
- While Law 19 is the foundation for establishing the CICH, it does not elaborate on the specific duties, obligations or responsibilities of CICH members. Therefore, it is recommended that a document defining the role, duties and responsibilities for each member of CICH be developed by ACP in consultation with each CICH member. It is suggested that this could occur within the context

of a policy dialogue as set out in the following section on "A Strategy for the CICH".

Private Sector Representation

Currently, among members of the CICH, there is no formal representation of the economic or private sector development interests. This would likely fall within the authority of the Ministry of Industry and Commerce (MICI).

It is recommended that the lack of private sector representation be addressed through consideration of options for inclusion of private sector interests such as the selection of a private sector NGO such as the local Chamber of Commerce (Acuerdo 16, Article 39), or the amendment of current regulations to allow the CICH to appoint Ad Hoc members as required or necessary for fulfilling the mandate of environmental protection and water resources for drinking water and canal operation.

Infrastructure Needs

In addition to addressing the current underlying legal foundation for the implementation of the Regional Plan, the CICH will need to address the regulatory challenges related to the investment in and development of required infrastructure within the Watershed.

Accordingly, it will be important to prioritize the diverse development activities, such as drinking water distribution and delivery systems; wastewater treatment systems; solid and hazardous waste collection, treatment and disposal; public transportation; communication; healthcare; and public safety. Such infrastructure is required to support land use development that is permitted within the Watershed, and which is essential for fulfilling the ACP mandate of environmental protection and the conservation of water resources for drinking water and canal operation.

Table 3 Legal Support Requirements of Environmental Infrastructure

Development Need	Infrastructure	Required Legal Systems
Drinking water	• Source (well, lake, river) • Treatment • Delivery	• Legal Authority ❑ clear responsibility ❑ agency coordination ❑ regulatory guidance ❑ enforcement & penalties for non-compliance ❑ conflict or dispute resolution • Permissions & Approvals ❑ design specifications and parameters ❑ environmental impact assessment (EIA) ❑ construction permits ❑ building codes ❑ performance standards ❑ operating permits • Financing & Investment ❑ investor due diligence ❑ loan approvals and contracts ❑ loan guarantees & insurance ❑ dedicated or other source of revenue ❑ on-going management ❑ financial restructuring
Wastewater	• Collection • Treatment • Disposal	
Solid waste	• Collection • Disposal (landfill)	
Hazardous waste	• Collection • Treatment • Disposal	
Public health	• Hospital • Clinics	
Public security	• Police • Local Government	
Public safety	• Fire department • Emergency response	
Communication	• Telephone system • Radio • Television (cable)	
Transportation	• Roads, bridges, etc. • Maintenance	

Regulatory Requirements

As part of an initial policy dialogue on the implementation of the Regional Plan via the CICH, it is recommended that a Regulatory Assessment be undertaken to assess the degree to which regulations, standards, norms, etc., exist to manage development based on the land use categories of the Regional Plan.

It is recommended that the "Normas Técnicas del Lago Alhajuela, November 1978 (protection and control of development)" be assessed to determine their applicability and usefulness as model regulations for development in a protected Watershed.

Specific regulations will need to be developed for the management of development within the Watershed, either as new pieces of legislation or incorporated from existing regulatory provisions. It is recommended that each CICH member be responsible for identifying those regulations within its

jurisdiction that would be applicable for managing the Watershed. For example, ANAM recently adopted standards for water quality.

Strategy for Policy and Legal Development for the CICH

Based on the current legal provisions, the following strategy is proposed as an option for developing the required policy and legal structures for the CICH.

CICH Policy Statement

As a strategy proposed for consideration, and as a means for initiating a policy dialogue among members of the CICH, the concept of a general "Policy Statement" that sets out in more detail the aims and objectives of the CICH should be proposed.

This Policy Statement would reflect the Constitutional mandate of ACP to manage water resources for canal operation and drinking water (Law 19, Article 120, 1) and safeguarding the natural resources of the Watershed (Law 19, Article 120, 2). It would help to establish the foundation by which the CICH will coordinate proposed activities within the Watershed. Further, it can lead to the development of criteria for this same purpose. Also, the initial policy dialogue can provide the basis of the identification of the specific roles and responsibilities of each member of the CICH. These roles and responsibilities can be reflected subsequently in bilateral or multilateral Inter-Institutional Agreements between ACP and the CICH, or ACP and each CICH member.

It is also recommended that the policy dialogue be used to establish a hierarchy of development priorities among ACP and CICH members. It is imperative that any official Policy Statement clearly reflect the legal mandate, namely the coordination of all parties with an interest in the Watershed.

Development of Terms of Reference for CICH Members

The next step proposed for the development of a more complete and effective policy and legal structure for the CICH would be for each individual entity that is a member of the CICH, namely the Ministry of Government and Justice, MIVI, MIDA, ANAM, ARI and the two selected NGOs, to develop "Terms of Reference" based on the current legal authority granted to each organization.

The individual Terms of Reference would be developed in a manner that provides for the distinction between the current full and broad legislative mandate for the organization, as well as under the narrower scope of organizational responsibilities within the Watershed. That is, the Terms of Reference would then be evaluated in light of the Constitutional and legislative mandate of ACP relative to the Watershed.

It is intended that these individual Terms of Reference would function as the basis of a more structured consensus-building policy dialogue to develop the single overall Terms of Reference for the CICH as an individual entity.

Development of Terms of Reference for the CICH

Based on the individual Terms of Reference developed by each CICH member, ACP would facilitate a policy discussion among the full CICH membership for the development of Terms of Reference for the CICH organization. These organizational Terms of Reference would be designed in terms sufficient to address the policy and legal needs of the CICH for effective coordination of entities with interest in development activities within the Watershed.

Codified Action: Plan, Interinstitutional Agreements, By-Laws and Regulations

The final element of the strategy would be based on all elements previously identified that would be required by each CICH member for the effective management of the Watershed. Based on the consensus that is developed within the facilitated policy dialogue, specific responsibilities would be codified using any one or combination of the following various instruments listed:

- Action Plan
- Inter-Institutional Agreement
- By-Laws
- Regulations

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Appendix 7

First Year Action Plan For The CICH

Executive Summary

This First Year Work Plan for the CICH covers the period beginning April 2000 through April 2001. The CICH was formally installed in March 2000.

The key elements of the first year work plan for the CICH relate to: (1) the CICH structure; (2) CICH functions; (3) CICH financing; and (4) CICH administrative support tasks.

Substantial progress has been made in making the CICH structure operational. Commissioners have been appointed, participating NGOs have been selected, and the Executive Secretary has been named. During the remainder of the first year the CICH should appoint CICH Secretariat's staff and organize Technical Advisory Ad-Hoc Working Groups.

The CICH needs to more clearly define its functions by developing a set of internal operating procedures that include provision for conflict resolution mechanisms. It needs to develop a comprehensive Inter-Institutional Agreement (or a series of bi-lateral Inter-Institutional Agreements) to resolve potential legal conflicts before they arise. In addition, the existing policy regimes for relevant sectors, e.g. water and land use, need to be reviewed as do possible donor-financed activities being considered for the Panama Canal Watershed. Pilot Regional Councils need to be established to help facilitate stakeholder involvement. Finally, a draft strategic plan should be developed.

The CICH needs to focus on identification of means to ensure financial sustainability. A sustainable finance plan should be developed and initiated.

Finally, there are some administrative concerns that must be addressed by the CICH. These include an evaluation of the first year work plan and development of the second year work plan.

Introduction

This First Year Work Plan for the CICH covers the period beginning April 2000 thru April 2001. The CICH was formally installed in March 2000.

Several key assumptions are important to develop a Work Plan for the Commission's first year. These assumptions are:

- That the CICH could evolve from the Base Scenario, in which its role is essentially coordination of watershed activity, to an Enhanced Scenario in which the Commission has a programmatic as well as a coordinating role; and
- That the organizational charts and staffing patterns for the CICH, under both the Base and Enhanced scenarios, as described in companion documents, are followed.

Key Work Plan Elements

Table I, at end of document, graphically depicts the key elements of the first year work plan for the CICH. A description of these key elements follows. These elements are arranged by: (1) CICH Structure, (2) CICH Functions, (3) CICH Financing, and (4) CICH Administrative Support Tasks.

CICH Structure

Substantial progress has been made in making the CICH operational.

Appointment of the Commissioners

Law 19 provides broad guidelines for the CICH membership, noting that the Commission would be made up of representatives from the ACP, ARI, ANAM, MIVI, MIDA, the Ministry of Justice and two NGO's. The Commissioners were named in March, 2000.

Selection of participating NGOs

Early in 2000, the ACP initiated the process for selecting the two organizations. This process was a formal selection activity in which interested entities were

asked to submit formal proposals discussing their purpose, credentials and the "value " they would bring to the Commission. Submissions were evaluated and ranked, according to established criteria. In April of 2000, Fundación Natura and Cáritas Arquidiocesana, were selected, and accepted the invitation to join the CICH as full members.

Appointment of Executive Secretary

A competitive process for the selection of the Executive Secretary was completed in July 2000. The Executive Secretary's subsequent tasks could include: (1) refining the scopes of work for the other staff positions, and (2) recruiting for and filling the positions.

Appointments to the CICH Secretariat Staff

The ACP has identified other positions for the Secretariat under the Base Scenario. These positions include, besides the Executive Secretary, an Area Coordinator, a Financial Officer and a Project Officer. If the CICH does evolve from the Base to the Enhanced Scenario, there will also be a need to recruit for additional positions.

Once the personnel of the CICH are selected and in place, team-building seminars could be carried out to develop a sense of cohesion and common purpose among staff. The seminars should not be "team building in the abstract," rather they should be practical and use examples of the Commission's work as the material around which to create a basis for unity of action.

Organization of Technical Advisory Ad-Hoc Working Groups

In order to contain costs and simultaneously take advantage of available technical capacity, the CICH could engage the services of Ad Hoc working groups to evaluate specific topics. The individuals making up these working groups will be selected from CICH member organizations and other entities in Panama. Examples of the tasks that these technical ad hoc groups could undertake would range from, reviewing watershed policies, coordinating land use planning, appraising the suitability of proposed investments in the watershed (both private and public sector) and evaluating the adequacy of existing watershed projects. During this work plan period, the arrangements (e.g., maximum length of assignment, supervision and reporting channels) will be clearly defined and initial

assignments made. The Ad Hoc working groups will be included in the team building seminars for CICH staff. These seminars will be organized by IRG. IRG could also assist in defining the discrete tasks of the Ad-Hoc groups.

CICH Functions

Inter-institutional Agreements (IA)

The CICH needs to identify the differences between the various legal instruments that govern each member organization and other entities of the government in order to coordinate the work of each and every government entity in the PCW. It is critical that a comprehensive Inter-Institutional Agreement be developed to clearly specify the roles and responsibilities of each CICH member. The contents of the IA must be practical, maximizing the particular expertise of each Commission member. It must also provide for an acceptable level of equity among participants so that the CICH can be a truly collaborative and effective body.

Developing the IA will require discussion and negotiation. IRG would be available to provide pragmatic technical expertise in support of the CICH negotiations.

Work already carried out by the ACP and IRG has laid the groundwork for developing the IA. To illustrate, Appendix 6 analyzes the legal conflicts that the CICH may face with regard to PCW management. It proposes a series of alternative mechanisms by which these conflicts might be resolved so that constituent members could carry out their responsibilities concerning the watershed, and work collaboratively to effectively manage the PCW. Similarly, earlier ACP-IRG work on the regulatory functions of CICH member organizations will be useful in developing the IA.

Internal CICH Operating Policies and Procedures

The CICH needs to establish its internal operating policies and procedures (by-laws) to clearly define how it will operate. Issues such as internal decision-making processes including conflict resolution mechanisms, relations of the CICH with its technical and regional advisory groups, and other possible mechanisms to incorporate concerns of non-CICH stakeholders need to be addressed. An initial discussion draft is presented in Appendix 1 of the Summary Report.

Conflict Resolution Mechanisms

Given the broad range of activities that the CICH must undertake, as well as the diversity of organizations in its composition, periodic legitimate disagreement among its members is to be expected. The Commission should formulate mechanisms (e.g. mediation) to resolve disputes efficiently and expeditiously.

Revision of Policies

Acuerdo 16 notes that the CICH has responsibility for, inter alia, "supervision of policy(ies) needed for adequate management of the watershed. Accordingly, an important task is a review of the existing policy regime. The review must address all of the relevant sectors (e.g., housing, land use, water use, agriculture, commercial/industrial development). Deficiencies in the policy regime will be identified and pragmatic recommendations made for correcting them. The policy review should begin soon after the Secretariat staff is in place.

Review of Existing Activities in PCW

Available data indicate that there are approximately three hundred active projects in the PCW. These projects range from private investment in industry, eco-tourism and commerce to international donor-financed interventions in agriculture, to housing, and health projects run by public Panamanian entities and NGOs.

These initiatives are also in various stages of implementation—from just authorized to near completion. A review of these initiatives will be required to determine if they are in compliance with the policies and objectives for PCW resource use established by the GOP. Cases in which there is serious non-compliance will be subject to retrofitting.

This activity is underway and it will continue until completed. ACP staff is carrying out this activity with the assistance of IDB. International donor-financed technical assistance (IRG) is available to assist with establishing the criteria and methodology to conduct the reviews.

Appraisal of New PCW Activities

The ACP is in consultation with international donors over a variety of possible new activities in the PCW (e.g., water resource infrastructure, housing, primary health care, public health infrastructure, and natural resources management). The NGO community and the private sector also have new initiatives under consideration. These activities must be appraised by the CICH to determine compliance with GOP objectives and policies for PCW management (hence the need discussed above to conduct the policy review). They must also be reviewed for their technical, economic and social viability.

The CICH Secretariat with the Ad Hoc working groups will implement this task. It will begin late in the work planning period and continue into the indefinite future. IRG could assist with developing methodologies and standards for activity appraisal.

Establishment of Pilot Regional Councils

Involvement of stakeholders, PCW residents, is critical to decision-making for the use of resources in the watershed. To engage the stakeholders in a direct and substantive way, the Executive Secretary will determine the number of Pilot Regional Councils to be established. The Councils will be established through formal PCW resident organizations (e.g. local government bodies, religious groups, and grass-roots NGOs). Once formulated they will become a conduit for "two way consultation" on activities (i.e. programs, policies, projects) to utilize and manage the PCW's resources. Stakeholder involvement can provide insights and "local knowledge" critical to maximizing the return on PCW investments. It can also contribute to "win/win/win" scenarios in which all parties, local residents, Panama as a country, and the CICH gain from the outcomes of this consultative process. This task would begin immediately after the CICH Secretariat is in place and will continue for the balance of the work plan period.

Draft Strategic Plan for Integrated Watershed Management

Under Law 21, ARI is responsible for facilitating implementation of the Regional Plan for the Eastern Part of the PCW. This plan deals exclusively with land use issues. While extremely important, land is only one aspect of watershed management—water and human settlement are also of vital importance. To be effective, watershed management must be addressed in a more comprehensive,

integrated manner. During this period, a more integrated plan is required to include the possible revision of the Law 21 of 1997. As such, it should contain policy and program analyses to identify impediments to integrated watershed management, elaboration of alternatives for environmental sustainability, definition of institutional roles and responsibilities in PCW management, identification of opportunities for eco-tourism, and other activities. In essence, much of the substance of an Integrated Watershed Management Plan will be generated by the tasks described above.

Watershed Monitoring Data Collection Activities

This activity is currently underway and will continue indefinitely. It will serve as the basis for monitoring the status of the watershed and, accordingly, making mid-course interventions when and if necessary (e.g. land use policy changes, agro-forestry investments, solid waste disposal initiatives). IRG could assist in the design of the Environmental Information Center.

CICH Financing

Initial Financing

In April of 2000 the ACP made a commitment to provide the Commission with $250,000 for its first year of operation and $480,000 for the second year. This commitment provides the CICH with adequate resources to function under the Base Scenario. It also provides the Commission with time to put in place a sustainable finance plan.

Sustainable Financing

This activity will begin with the arrival of the CICH´s Executive Secretary who will be responsible for managing it until a professional fundraiser is hired at a later date. Again, international technical assistance (IRG) is available to assist with putting the plan into action.

The plan should focus on developing core revenue streams that are identified in Appendix 4. These core streams include, in addition to ACP budget transfers, financing by international donors and/or NGOs, creation of an endowment fund, and access to existing sources of funds such as the FIDECO Trust Fund.

CICH Administrative Support Tasks

Evaluation of First Year Work Plan submitted to ACP for approval

This activity will be carried out in the final month of the work plan period. Preferably it should be conducted by an entity outside of the CICH in order to arrive at an objective appraisal of progress. The CICH could contract for these services on the local market. ACP procurement procedures would be helpful in procuring the required services.

Develop Second Year Work Plan

This activity should be carried out in the final (twelfth) month of this work plan. It will be a natural follow on to initiatives begun during the first year of operations, broadening and deepening progress achieved and making adjustments where warranted.

IRG could collaborate with the CICH in the development of the Work Plan II.

Table 1 Schematic Summary: Key Elements of 1st Year CICH Action Plan by Month

Work Plan Months

Key Activity	1	2	3	4	5	6	7	8	9	10	11	12	Chief Responsibility
CICH Structure: • Appointment of Commissioners	X												ACP and other CICH members
• Selection of NGO's to CICH		X											ACP and CICH members
• Recruitment of CICH Executive Secretary				X									ACP and CICH members
• Recruitment of CICH Secretariat Staff					X	X							Executive Secretary and CICH
• Organization of Technical Advisory Group					X								CICH and IRG
CICH Functions: • IA between ACP and other institutions				X									CICH and IRG
• Internal CICH Operating Policies and Procedures				X									CICH
• Conflict Resolution mechanisms adopted and used						X	X	X	X	X	X	X	CICH
• Revision of Policies						X	X	X					CICH and Ad Hoc Technical Advisory Groups

Key Activity	1	2	3	4	5	6	7	8	9	10	11	12	Chief Responsibility
• Review of existing projects in PCW							X	X	X	X	X	X	CICH, IRG and Ad Hoc Technical Advisory Groups
• Appraisal of new proposal activities for the PCW										X	X	X	CICH, IRG and Ad Hoc Technical Advisory Groups
• Establishment of Regional Councils						X	X	X	X	X	X	X	CICH and ACP
• Draft Plan for Integrated Watershed Management											X	X	CICH and ACP
• Environmental Information Center												X	CICH, IRG and Ad Hoc Technical Advisory Groups
CICH Financing • Initial (first two years) financing		X											ACP
• Sustainable Finance Plan adopted and initiated						X	X	X	X	X	X	X	CICH, IRG and Ad Hoc Technical Advisory Groups
CICH Administrative Support • Evaluation of Work Plan I												X	CICH
• Development of Work Plan II												X	CICH and IRG

Appendix 8

Analysis Of Inter-Agency Watershed Entities

Executive Summary

The Environmental Regulations for the Panama Canal Authority (ACP) briefly describe the composition and scope of functions of the Inter-institutional Commission for the Canal Watershed (CICH)[37]. They do not go into any detail and leave the task of defining the CICH structure to the Commission itself. The CICH will need to define more precisely its objectives and functions. Based on a clear understanding of those factors it must decide on its organizational structure.

The purpose of this document is to help inform the initial decision-making with regard to the structure and functions of the Inter-Institutional Commission for the Panama Canal Watershed. This paper will review worldwide experiences to help provide a better understanding of the range of watershed management strategies and tactics that exist. This information will help Commission members make decisions about objectives, functions, structure, and processes; and how they may wish to proceed.

Analytical Framework. The elements of an analytical framework include:

- The socio-economic, environmental, legal and political context;
- The objectives of the organization;
- The functions of the organization; and
- Organizational Structures and Decision-Making Mechanisms.

Varieties of Institutional Arrangements. This document examines a variety of watershed and other integrated resources management entities in the United States, Latin America, and elsewhere. These include: (1) the Tennessee Valley Authority, the Southern Appalachian Man and the Biosphere Program, the

[37] Comisión Inter-institutional para la Cuenca Hidrográfica del Canal.

Interstate Commission on the Potomac River Basin, the Chesapeake Bay Program and the Tri-State Water Quality Council in the United States; (2) the Sao Francisco River Valley (Brazil), the Cauca Valley Corporation (Colombia), and the Lerma-Chapala Basin (Mexico) in Latin America; and (3) the experience of other countries such as France. These examples illustrate a variety of organizational structures and decision-making processes.

Synthesis of Experience and Potential Applications to the CICH. The CICH has to undertake several major organizational tasks. The case studies are intended to stimulate debate and discussion among the CICH members and other stakeholders about the best way to organize itself. There is no one specific organizational structure that will assure the success of the CICH. Nevertheless, there are a number of conclusions which are relevant to the CICH that can be drawn from the case studies. Key conclusions are found in Table 1.

Table 1 Experience of Inter-Institutional Watershed Management Entities and Applicability to the CICH

TOPIC AREA	FINDING	RELEVANCE FOR CICH
Context	The organization needs to understand and be able to work within the parameters established by the context in which it works.	The CICH must consider the socio-economic and environmental context but also factors such as demographics, governmental and legal structures, and the political environment.
Objectives	Objectives need to be well-defined and agreed upon by all key stakeholders. Achieving consensus may take time. A formal "Mission statement" or Compact that key stakeholders sign can be developed.	A written commitment signed by key stakeholders can facilitate the success of the CICH.
Functions	The greater number of functions that an entity assumes, the more likely it is to ignore or fail to carry out some of them. Most agencies have more success in dealing with water issues than with land-based issues that may require land use changes.	The CICH, as a new entity should start slowly, and evolve. It can evolve and add functions over time.
Structure	The structure of an agency with program implementation responsibilities may have "verticality" but an effective structure for an inter-institutional watershed management entity is flat and should include member agencies and key stakeholders in the decision-making process.	The CICH needs to have a flat organizational structure that facilitates inclusion of key stakeholders in decision-making.
Role of Executive Director	Must be seen as impartial and not beholden to any one of the member organization. Major roles for an executive director include facilitation of shared information and resources.	Although the ACP contributes the major part of the CICH's operating funds, the Executive Director must be seen as impartial.
Decision-Making Process	The decision-making process must be based on sound scientific, technical and economic analysis as well as on continuous monitoring, research, and analysis.	Informed decision-making will reinforce the CICH's credibility, increase the likelihood that programs will address priority issues, and reduce unwarranted expenditures.
Public Participation	The "public" including basin residents and users of water services must have an input into the watershed management entity's decision-making process.	The CICH should have an advisory committee structure that includes both PCW residents and major water users.
Finances	Finances will inevitably be a major concern. However, some inter-institutional watershed management entities have been able to improve the cost-effectiveness of participating agency programs and have not required a significant level of additional resources for their operation.	The CICH will need to monitor its financial status continuously. It can reduce its funding requirements if it is able to coordinate programs of other public and private organizations to make them more cost-effective.
Geographic Scope	Effective watershed management entities, especially those that deal with basins covering large areas are often most effective when they initiate programs in smaller catchments within the basin. Normally, the catchments are selected because they are the most critical, either from the standpoint of water quantity or of water quality.	The CICH should prioritize its efforts on areas within the PCW that are critical in terms of water quality and quantity.

Major Institutional Issues. The CICH needs to consider four major institutional issues as it begins its organizational process. These are: (1) the scope of its objectives; (2) types of decision-making processes; (3) management information requirements; and (4) financing.

Scope of Objectives

Economic Development vs. Environmental Protection. Watershed management organizations may have economic development objectives, or may focus on environmental objectives. CICH regulations refer to the PCW's "sustainable development" and to the possibility of financing and supervising projects. The CICH needs to define "sustainable development". A focus on economic development objectives requires a "corporate" operational structure for direct, proactive intervention. A focus on environmental objectives such as water quality and biodiversity can often be addressed through inter-institutional consensus-building with implementation undertaken by constituent agencies.

Implementation vs. Coordination. The CICH must define whether it will serve an implementation or a coordination mechanism. It must determine if it will implement activities, either directly or by serving as a funding source for sustainable development or environmental management programs in the PCW or whether it will try to improve resource use by facilitating coordination of public and private sector resource management policies and programs.

Types of Decision-Making Processes and Stakeholder Involvement

Two forms of decision-making are used by watershed organizations: formal, "majority rules" decision-making, and informal consensus-based decision-making. Many organizations use consensus-based decision-making with great effectiveness. Often this approach is linked to the use of a committee structure that involves representatives from member agencies and key stakeholder groups. However, consensus-based decision-making can take more time.

Management Information Requirements

The formulation of priorities and courses of action benefits significantly when problems and issues are clearly understood. In the Panama Canal Watershed

previous monitoring activities show that reservoir sedimentation is less of a problem than many had anticipated but that water quality is declining. A priority for the CICH is to define the information needed to make sound management decisions and to determine the monitoring program required to provide that information.

Financing of Watershed Management Activities

Financing and the development of financing mechanisms is likely to be one the most difficult issues for the CICH. Financing is a major problem that faces most watershed management entities. The CICH will need to spend considerable time and effort on financial concerns.

Purpose

Law 19 mandates that water management (control) will be the responsibility of the ACP, the management, protection, and conservation of other natural resources will be the responsibility of the Inter-institutional Commission for the Canal Watershed. However, it assumes that quality and quantity of water resources depend on management of the watershed's other natural resources and land uses.

The Environmental Regulations for the Panama Canal Authority briefly describe the composition and scope of functions of the CICH.[38] They do not go into any detail and leave the task of defining the CICH structure to the Commission itself.

The Regulations provide that[39]:

- The objective of the CICH is to integrate efforts, initiatives and resources for the conservation and management of the Watershed;
- The CICH should promote sustainable development of the Watershed;

[38] The member organizations of the CICH are the Panama Canal Authority, The Authority for the Inter-Oceanic Region, The Ministry of Agricultural Development, The Ministry of Housing, the National Environmental Authority, the Ministry of the Interior, and two non-governmental organizations: Fundación Natura and Cáritas Arquidiocesana.

[39] See Annex A for the full text of the pertinent regulations.

- The major functions of the CICH are to establish coordination and funding mechanisms; supervise and evaluate Watershed programs and policies; and maintain an environmental information center for the Watershed;

- The CICH can obtain international technical and financial cooperation through the offices of the ACP;

- The CICH is responsible for developing its own internal procedures.

These mandates are very broad. The CICH needs to define more precisely what it is going to do and how it is going to do it as one of its first tasks. Among those issues that the CICH needs to address are: (1) whether it is going to focus strictly on issues directly related to water quality and quantity or whether it will attempt to address broader "sustainable development" concerns; (2) whether it will serve strictly as a coordinating body or whether it will become involved in program planning efforts; (3) how it will deal with the new expansion of the Panama Canal Watershed?[40] The CICH also needs to define its organizational structure and operational processes. The CICH structure and processes should be based on more precisely defined objectives and functions.

The creation of this inter-institutional commission is not the first effort in Panama to create a permanent inter-institutional structure. However, there are few examples of successful institutionalization of those prior efforts.[41] There are, however, a wide variety of worldwide watershed management experiences based on the creation of watershed/river basin-specific management structures. Some of these have been successful in carrying out their function over relatively long periods of time. As the newly created ACP and the other organizations that compose the CICH undertake the task of operationalizing it, an understanding of the range of watershed management strategies and tactics will help Commission members make decisions about how they will proceed.

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[40] In 1999 additional watersheds covering approximately 220,000 hectares were decreed to be part of the Panama Canal Watershed. This was done to give the ACP the authority to control their water resources with an eye toward future inter-basin water transfers in order to augment the amount of water available for an expansion of Canal traffic. Obviously, the identification of an expanded Panama Canal Watershed is a misnomer, but it is used in order to allow the ACP to control the waters in those watersheds.

[41] For example an "Inter-institutional Technical Committee for the Panama Canal Watershed" was established under the auspices of the MARENA project financed by USAID in 1993. This technical committee included more than 60 professionals from public, private and non-governmental organizations. It produced a strategic management plan for the Panama Canal Watershed in 1995, but it's efforts did not go beyond that task.

The purpose of this document is to review a variety of watershed management and other integrated resource management experiences. It will identify conditions and characteristics that may be applicable to the CICH and illustrate a range of management options that the CICH may wish to evaluate as it makes decisions about management of the Panama Canal Watershed. While there are examples from all parts of the world, this paper will focus principally on experiences in the U.S. and Latin America.

The analysis of the experiences will focus on the formal and informal management arrangements that have been created among participating organizations as well as principal stakeholders. The analysis presented herein evaluates characteristics of other inter-institutional entities and determines what may be applicable to the conditions of the CICH. It will highlight what has proved to be successful in other experiences and what has not been successful, for consideration by the members of the CICH.

Analytical Framework for Inter-institutional Arrangements

In order to assess the effectiveness of inter-institutional arrangements an analytical framework is required. This framework should include the context; objectives; functions; structures; planning and decision-making processes and mechanisms of the watershed/river basin management organizations.[42]

Malcom Newson has developed a summary analytical framework, presented in Table 2, which covers these points.

[42] The concept of "watershed" and "river basin" are used interchangeably in this paper. The Spanish word "cuenca" can be translated either as [river] basin or watershed. In general usage "river basin" usually refers to the drainage basin of a large river while "watershed" usually refers to the smaller drainage basin(s) of tributary rivers and streams.

Table 2 Integrated Basin Management: An Analytical Framework

ASPECTS	COMPONENTS
1. Context	State of the Environment (River Problems) Economic Conditions Legal, Administrative and Financial Arrangements Prevailing Ideology
2. Legitimization	Objectives of Basin Organization Responsibility, power, authority Rules for intervention, conflict resolution
3. Functions	Generic functions, e.g. data collection Substantive functions, e.g. resources, pollution
4. Structures	Central vs. Dispersed (functional, geographic) Accountability, Flexibility
5. Processes/mechanisms	Councils, committees, task forces Professional linkages – interdisciplinary action Plans and Planning processes Benefit-cost analysis Environmental assessment Public participation
6. Cultures/attitudes	Service to public Bargaining/partnerships

Source: M. Newson, Land, Water and Development: Sustainable Management of River Basin Systems, p.288. Based on B. Mitchell (ed.), Integrated Water Management, 1990

This classification of factors provides a number of key elements to consider in the analysis of inter-institutional watershed management arrangements. These elements will form the basis for the analysis of several case studies reviewed in this document.

Context

The context of the creation of a river basin management organization directly affects its objectives, functions and structures. The economic conditions, demographic factors, the political and legal situation, and a wide variety of other factors may influence it. These factors need to be identified and explicitly considered if the river basin management entity is to be successful.

A major contextual factor is the socio-economic context to which the river basin management organization is a proposed response. Historically, many river basin organizations were created in areas that were considered "backward" and where living standards were considered to be unacceptably low. In these instances they

have been used as a mechanism to accelerate regional economic development through enhanced use of water resources for electricity generation, flood control, irrigation, etc. Examples include the TVA in the U.S., and the Cauca Valley Corporation and the Sao Francisco River Basin Commission in Latin America.

In other instances the context of the creation of river basin organizations has been the need to address issues of water quantity (allocation) and water quality that are the result of economic growth and development, e.g. the Interstate River Basin Commissions and the Chesapeake Bay Program in the U.S., as well as the Lerma-Chapala Basin Council in Mexico.

In Panama the context of the establishment of the CICH has been a response to the perceived need to manage the natural resource base and land use within the Panama Canal Watershed in order to maintain adequate water quantity and quality for Canal operations and for potable water for the cities of Panama and Colon. However, the context has now changed somewhat since the CICH mandate will also include three additional watersheds that have been legally declared part of the Panama Canal Watershed. While the objective is still to provide water for the Panama Canal, the CICH will have to deal with a different set of conditions and circumstances related to dam construction, inter-basin water transfers, as well as major land use changes and population resettlements that were not contemplated in 1997 when Law 19 was promulgated.

The concept of "context" must take into account not only the economic and social reality but also the environmental, legal and political context, especially with regard to governmental organization. It is important to understand what agencies are already engaged in natural resources management or other activities that have a bearing on the management of the river basin. These agencies are likely to be stakeholders in river basin management, as are farmers and other economic actors and residents of the basin. These groups will need to be brought into the decision-making process of the river basin management entity in some manner. Often, a first task in the creation of a river basin organization is to do an assessment of the situation. This assessment may focus only on environmental factors or may be more comprehensive and analyze all contextual aspects. The latter approach is likely to have more positive results.

Objectives

A clear understanding of and agreement with the objectives of a watershed management/river basin management organization are necessary to define its functions and structure. These objectives may range from a broad and comprehensive economic development objective to a relatively focused and narrow objective of water quality improvement. This understanding must be shared by the stakeholders of the organization. Without these any new watershed management structure is likely to be perceived by stakeholders as an unnecessary additional layer of bureaucracy and will be doomed to failure. Many inter-institutional river basin organizations have participating organizations sign a Compact or a Mission statement that clearly spells out the objectives of the organization. It is also important to clearly understand the objectives of each participating organization. Mitchell has observed that "knowing the objectives of each participating agency should help to identify both common and divergent interests. Clarity of objectives by itself will not ensure integration [of water management], since different agencies almost inevitably will have objectives which conflict."[43]

Key Functions of Inter-institutional Arrangements for Watershed/River basin Management.

There are a number of key functions for which a watershed management entity may be responsible. These functions may include: (1) allocation of available water; (2) operation of water-based facilities such as include hydro-power; canal/lock operations; flood protection; supply of water for human and industrial consumption as well as for irrigation; (3) regulation of certain activities within the watershed/river basin to control water quantity/water quality and other environmental factors.

A technical report prepared by Axel Dourojeanni for the Economic Commission for Latin America provides a useful classification of the varieties of watershed/river basin management. (See Table 3 below) Dourojeanni identifies three management phases: (1) studies, plans and projects; (2) investments; and (3) operation, maintenance, management, and conservation. He also identifies three types of management objectives, ranging from comprehensive to limited: (a)

[43] Mitchell, Integrated Water Management, p. 8

integrated use and management; (b) use and management of all natural resources; and (c) use and management of water resources. These categories of phases and objectives are cross-referenced to develop a classification matrix that describes the degree of involvement in the management of resources in a river basin context.

This classification scheme provides a useful tool to help clarify the management objectives and functions of a specific river basin organization. Of particular interest for the CICH is the third stage of operation, maintenance, management and conservation of the Panama Canal Watershed because major infrastructure investments for the canal, hydropower and potable water are already in place. However, as the proposed expansion of the Watershed area and the likely construction of new reservoirs to provide additional water for canal operations moves forward, the first and second stages, i.e. planning and infrastructure development, will also again come into play. In this regard it is important to consider that both the Panama Canal Authority and the CICH have legally mandated "watershed management" functions. The ACP will be responsible for any major infrastructure works but there are other functions that must be allocated between them.

Table 3 Classification of Management Activities in Watersheds

MANAGEMENT STAGES	RIVER BASIN MANAGEMENT OBJECTIVES		
	(a) Integrated Use and Management	(b) Use and Management of all Natural Resources	(c) Use and Management of Water Resources
(1) Preliminary Stage		Studies, Plans, and Projects	
(2) Intermediate Stage (investment)	River Basin Development	Natural Resources Development	Water Resources Development
(3) Permanent Stage (operation, maintenance, management, and conservation)	Environmental Management	Natural Resources Management Watershed Management	Water Resources Management

Economic Commission for Latin America, "Public Policies for Sustainable Development: Integrated River Basin Management, 1994

Organizational Structures and their Planning and Decision-making Processes and Mechanisms.

Two major types of organizational structures have evolved over the years: authorities and commissions. Authorities (and corporations) tend to have unified structures and to have a fair degree of autonomy with direct operational

responsibilities for infrastructure investments and/or provision of services. Commissions (and councils) tend to be composed of representatives from multiple institutions, often including a variety of executive branch agencies and/or smaller political units (states, municipalities). They tend to serve more as consensus–building and coordination mechanisms that can help facilitate financing and implementation of programs by constituent entities or third parties. These organizations tend to have a more limited focus on water resources management.

Watershed/river basin management authorities such as the Tennessee Valley Authority and similar organizations, e.g. the Cauca Valley Corporation are invested with direct watershed management responsibilities. They tend to focus on integrated river basin development that includes the construction and operation of major infrastructure; they usually have a degree of autonomy from other governmental organizational structures that includes their own sources of income, whether from the national (federal) budget, revenues from specific taxes, and/or income derived from the provision of services, e.g. electricity generation, canal operations, etc. Although these organizations may have a formal process for obtaining public comment on their plans and programs, their managers may not feel compelled to take decisions based on full stakeholder participation in the decision-making process.

Inter-institutional arrangements such as the Interstate River Basin Commissions and the Chesapeake Bay Program in the U.S and the Lerma-Chapala Basin Council in Mexico tend to focus their efforts on water quality and/or water quantity issues through cooperative means. They may undertake studies, monitoring, and information dissemination. They may also exercise regulatory functions or coordinate the efforts of their constituent member organizations. In some cases, e.g. the Interstate River Basin Commissions, their membership is composed of co-equal State governmental authorities. In other instances, e.g. the Chesapeake Bay Program and the Lerma-Chapala Basin Council, there is a more inclusive organizational structure that includes multiple federal (national) governmental organizations as well as representation by local governments and other stakeholders in decision-making, either directly or in an advisory capacity.

With respect to alternative organizational arrangements Mitchell suggests that, “[I]f the alternatives are viewed as points along a continuum, numerous

possibilities are available….it is misguided to think of alternatives in either-or terms."[44]

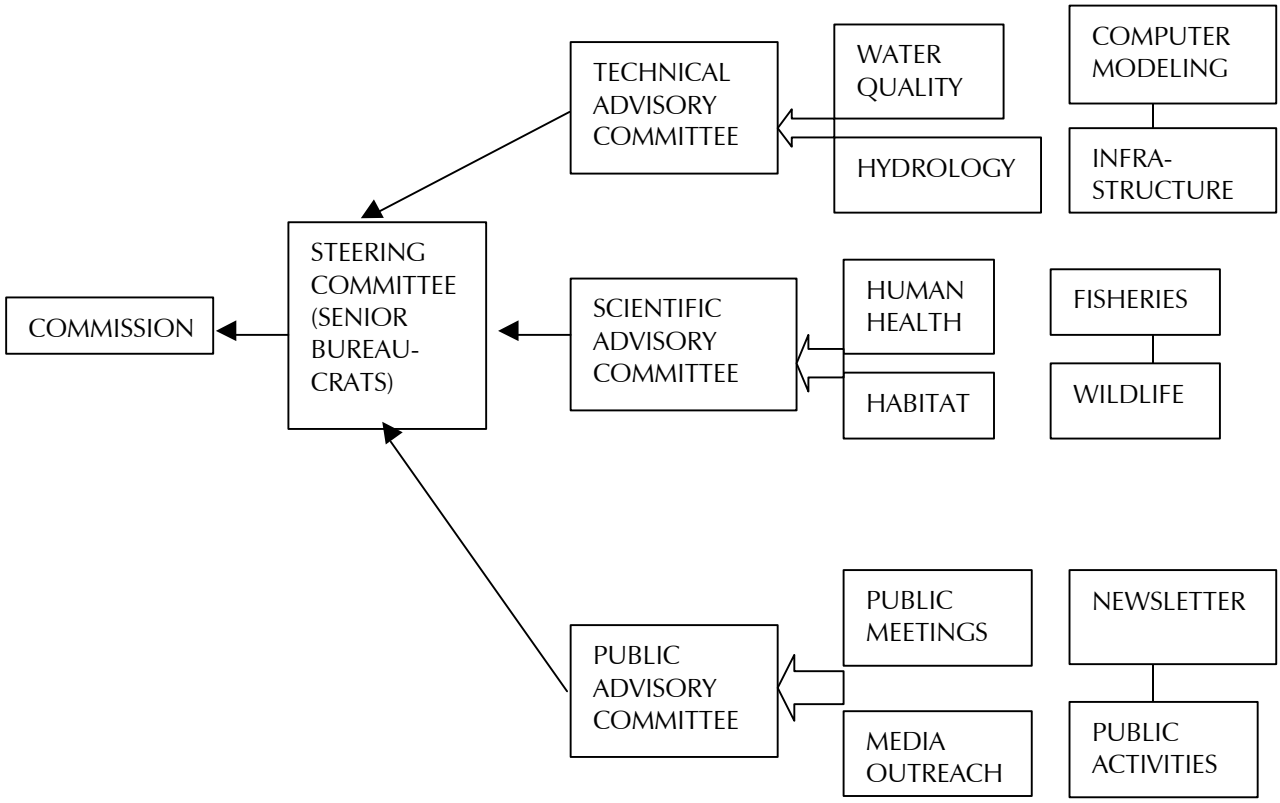
Whatever the structure of a river basin management entity here will be a need to have processes and mechanisms to facilitate integration. These include processes to facilitate bargaining, negotiating and mediating among the different interested parties.[45]

Figure 1 represents a "typical" organizational structure for inter-institutional commissions in North America. This structure formally emphasizes the input of scientific, technical and the (public) stakeholder communities in the watershed planning process. It illustrates the desirability of an open consultative process that informs and influences the decisions taken by an inter-institutional commission. It illustrates the evolution that has occurred in water resources management from an engineering/economics focus to one which also factors in scientific (e.g. environmental concerns) and sociological factors as represented by the technical, scientific, and public participation committees.

[44] Mitchell, p. 10.

[45] Mitchell observes that "Whereas society may gain through more coordination and cooperation among public agencies, some individuals will perceive themselves as becoming losers through reduction in or loss of authority, shrunken empires and reduced leverage or influence. In such situations, lip service may be given in support of integration, but in practice low-risk strategies such as delay, systematic misinformation and minor sabotage will be utilized to hinder its implementation. Identifying the characteristics of the organizational culture and the participants´ attitudes regarding disincentives and incentives for integration therefore becomes important." p. 15.

Figure 1 Typical Advisory Committee Structure for Interinstitutional Watershed/River Basin Management[46]



[46] From Isabel Heathcote, Integrated Watershed Management: Principles and Practice, 1998, p. 129

Varieties of Watershed/River Basin Management Institutional Arrangements.

A wide variety of organizational arrangements for management on a watershed basis are being employed throughout the world. Thousands of watershed management organizations exist in the world today. This section discusses several examples to help illustrate how institutional arrangements may be structured. These examples help identify key aspects and attributes of these arrangements that may contribute to or hinder achievement of their objectives. The examples have not been chosen because they are "success stories" but because they illustrate a range of experience and because several of them are already familiar to some of the Panamanians who may be involved in the process of formation of the CICH.

Several examples of integrated resources management experiences are presented that illustrate one or more of the key analytical factors mentioned in section II. Strengths and limits of different organizational structures will be identified.

As mentioned in the previous section there are two major categories of formal institutional arrangements: authorities and inter-institutional commissions. This section examines examples of both types of organizations but will focus on inter-institutional arrangements. As mentioned above authorities tend to have direct operational responsibilities for provision of services while commissions tend to serve as coordination mechanisms. In the Panamanian context both types of organizational structures obtain. The Panama Canal Authority has direct operational responsibilities for the allocation of the water resources within the Panama Canal Watershed while the Inter-Institutional Commission is charged with coordinating environmental management.

In the U.S. the earliest notable watershed management experience was that of the Tennessee Valley Authority (TVA), which was created in the 1930s. Subsequently, beginning in the 1950s, a number of Interstate River Basin Commissions were created as have other organizations, e.g. the Lower Colorado River Authority. More recently other regional management mechanisms, e.g. the Chesapeake Bay Program, have been created around the watershed concept. More recently, other similar types of management mechanisms, e.g. the Southern Appalachian Man and the Biosphere program, have been based on eco-systems (rather than a strictly watershed approach).

In Latin America the first management entities for integrated river basin development were created between 1947 and 1955. In Brazil the Sao Francisco River Valley Corporation was established in 1949. In Colombia the Cauca Valley Corporation was established in 1954 with U.S. technical assistance and a loan from the World Bank. In Mexico several River Commissions were established in the late 1940's and early 1950's.

There are also a large number of watershed/river basin management experiences in developed and developing countries that also offer some insights on structural issues related to watershed management organizations. Some examples of experiences of France are briefly discussed.

The following sub-sections present a variety of experiences. Some expanded case studies are included as Annexes to this document.

U.S. Experience

The Tennessee Valley Authority (TVA) Experience

The TVA was the first comprehensive river basin development and management organization to be created in the U.S. It is not an inter-institutional management entity but it is one of the most successful and well-known river basin organizations in the world. The TVA was established as a Federally chartered Corporation in 1933 in the midst of the Great Depression in one of the poorest regions of the U.S. It was created during an era of active federal government efforts to reactivate the economy through public sector programs. Its area of influence covers 109,000 sq. km. The TVA has successfully fulfilled its principal objective of stimulating economic growth in the region. It built multi-purpose dams for flood control, navigation and hydroelectric power, and it helped improve agriculture. Nevertheless, the TVA experience has never been replicated in the U.S.

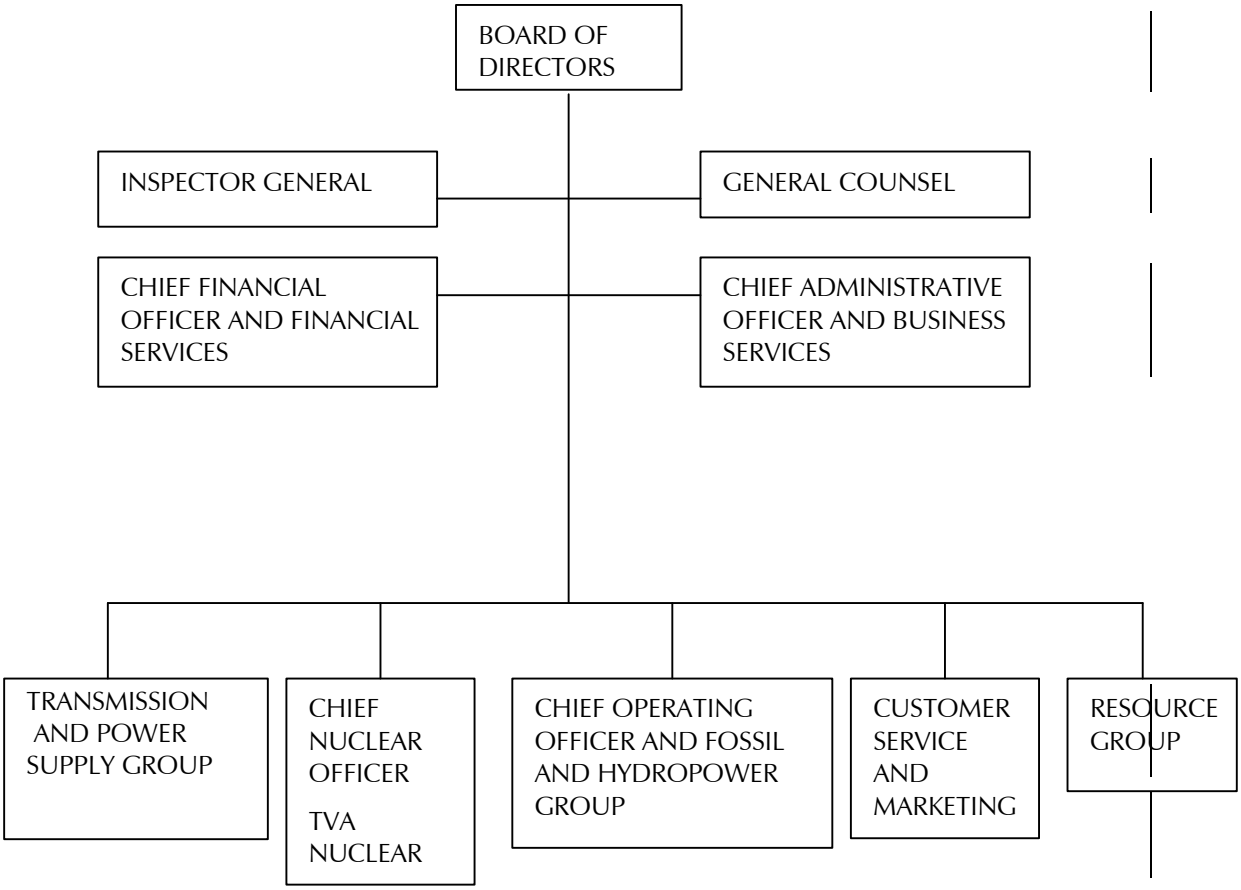
The TVA has been structured to have autonomous operating divisions (see Figure 2) which have allowed the TVA to be "action-oriented," especially during the period when it was building dams and other structures.[47] Its hierarchical structure

[47] Barbara Miller and Richard Reidinger, "Comprehensive River Basin Development: The Tennessee Valley Authority," World Bank Technical Paper No. 416, 1998. The section of this paper on the TVA experience relies heavily on the analysis contained in the paper by Miller and Reidinger.

reflects its functions as an operating agency. The structure is less conducive to adequate stakeholder involvement in decision-making. Even in those activities where it needs direct linkages to basin residents, e.g. for water quality improvement activities, it has tended to be top down and directive with negative consequences for long term sustainability of its programs. However, it does have extensive data collection and analysis capabilities that it shares with other agencies. It has environmental education and outreach programs for the public. Recently the TVA has created Watershed Action Teams and is working with more than 50 volunteer groups to reduce pollution. These teams are less directive and hierarchical. The TVA has very limited responsibility for land management. Most of the basin is in private hands or belongs to other agencies.

The TVA received funds directly from the U.S. government from its creation up until 1999 when appropriations were terminated. Although the TVA now generates much of its revenue from electricity generation and transmission, it is reluctant to allocate funds from this source to other types of activities in light of the deregulation of, and increasing competition in, the electricity sector that is taking place in the U.S. Miller and Reidinger conclude that the TVA will have to seek innovative ways to finance its resource management activities.

Figure 2 Organization of the Tennessee Valley Authority



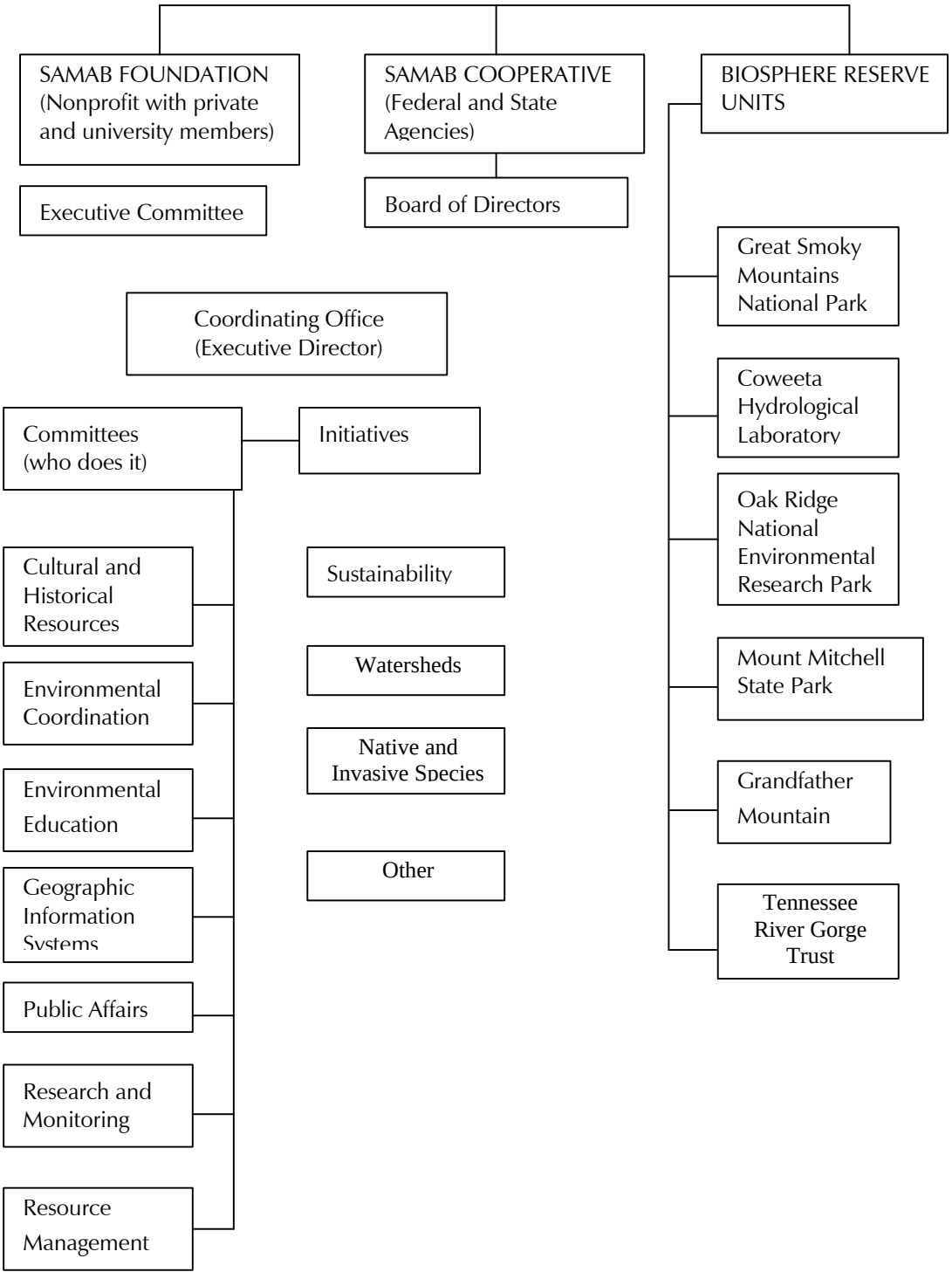
Southern Appalachian Man and the Biosphere Program (SAMAB)

The SAMAB is a voluntary inter-institutional program for which the objective is to serve as a model of cooperative, integrated regional resources management. It consists of the SAMAB Cooperative, which is composed of federal and state agencies, and the SAMAB Foundation, which is a non-profit organization composed of non-governmental organizations, private industries, universities, and local communities that support SAMAB programs. It covers the southern Appalachian Mountains and includes the Tennessee Valley Authority, which is one of its member organizations. Ten other federal agencies including the U.S. National Park Service, the U.S. Forest Service, and the Environmental Protection Agency, and three state conservation agencies, are also members.

The major focus for the SAMAB initially was resource conservation but it has also begun to develop a broader sustainable development objective. The SAMAB program began in 1988. A key element of the SAMAB program is the existence of biosphere reserves, e.g. parks and nature preserves that serve as the proving grounds for ecological research and monitoring. The "lessons learned" are then extended through collaborative, voluntary community demonstration projects. SAMAB has focused extensively on building stakeholder support. Through the efforts of its member agencies the SAMAB has undertaken an extensive resource assessment and is engaged in monitoring forest resources, community outreach and education, and preservation and promotion of regional cultural resources. It has created a major data base for the region that it uses in these programs.

The SAMAB program has a very small coordinating office with a full-time executive director and several part-time support staff. Its work is done through a committee structure, and staff time and other resources for specific programs/projects are funded through pooled funds from cooperating agencies. The participating agencies benefit because there are program efficiencies generated through shared information and elimination of redundant efforts. However, most agencies have limited flexibility to redirect funds. SAMAB lacks a reliable long-term financial base. The SAMAB Foundation has fund raising as an objective but has not had major success to date. Nevertheless, the SAMAB is a good example of a management structure that can function effectively with little direct financial support. Its lack of substantial funding on a sustained basis forces it to make sure that its programs are cost-effective and productive.

Figure 3 SAMAB Program Organizational Structure



Interstate River Basin Commissions – The ICPRBP

A river basin management model commonly used in the United States is that of River Basin Commission. More than 30 river basin commissions coordinate water resources management in major U.S. river basins. The Interstate Commissions deal with water resources issues that result from the shared utilization of a common resource by two or more sovereign states. They tend to focus on water related issues only. They are established by formal compacts among the states that are legal instruments when ratified by the U.S. Congress and participating state legislatures. The compacts deal with one or more of the following issues: water allocation; pollution control and planning; and/or flood control.[48]

The Commissions have a wide variety of mandated functions.[49] Almost all have an information/education function. Most also have a coordination function, although this is often based only on information exchange. Many commissions undertake special studies related to water quality, flood control, navigation, hydroelectric generation potential, or other water related issues. Several commissions are charged with comprehensive planning and a few have been charged with project planning, financing, and operation. Some commissions also have a regulatory function. Finally, many commissions undertake informal mediation, and some have a formal responsibility for mediation.

An example of a River Basin Commission is the Interstate Commission on the Potomac River Basin (ICPRB). It was established in 1940 to address the rapidly increasing water pollution problems including industrial waste and sedimentation. It was formed through an interstate compact adopted by Maryland, Virginia, Pennsylvania and West Virginia and the District of Columbia that was ratified by the U.S. Congress. The original mandate of the ICPRB was to control and reduce water pollution in the Potomac River and its tributaries through fact-finding, research, education and coordinating the efforts of member states. In 1970 the ICPRB's mission was expanded to include water and land resources in the basin as well as water quality.

The ICPRB focuses on water quality, water supply, biology and public outreach. It does research and monitoring related to water supply, water quality and

[48] Peter Black, Conservation of Water and Related Land Resources, p. 118.

[49] See Missouri Basin States Association, pp. 31-40.

biodiversity. It provides planning assistance for both water supply and water quality to states and localities within the basin. Relatively little focus is directed to the land resource base.

Generally, the responsibility for taking action on the ICPRB's findings and recommendations remains with the member states. However, with regard to water allocation and management, the "Section for Cooperative Water Supply Operations in the Potomac (CO-OP)" coordinates water supply operations from the Potomac River and four off-Potomac reservoirs during drought periods. Three independent utilities have ceded final decision-making about water withdrawals to the ICPRB which provides them with "operating rules" based on its hydrological modeling and monitoring.

The ICPRB has a staff of about 20 people and undertakes the majority of its activities on a project basis. That is, individual projects that have a beginning and end are funded through cost share programs that use some funds from the States to match Grants available through federal programs. Commission staff, commissioners and state agencies identify priorities and put together financing packages.[50] In this context, the ICPRB has five advisory committees. While there is no formal mechanism to elicit public participation in program formulation Commission staff make themselves available to members of the public, and NGOs contact Commission staff on technical issues. The ICPRB views its function as a technical advisory body rather than as a decision-making entity. However, member States sometimes use it to provide decision support services on policy issues. In its context the ICPRB functions somewhat as a consulting organization.

According to one long-time ICPRB staff member, the Commission's major strengths are: (1) that it does technically sound, objective analysis; (2) that the Commissioners have quite diverse backgrounds; and (3) that discussions take place and consensus is reached before projects are undertaken. [51]

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[50] Roland Steiner, personal communication, December 16, 1999. Currently the States contribute about 20-25% of the ICPRB's budget and projects account for the rest. In the early decades of the ICPRB (before major resources became available through the federal government in the early 1980's) agency staff was quite limited and Commissioners often carried out agreed-upon tasks by using staff from their home State agencies.

[51] Steiner.

Chesapeake Bay Program

The Chesapeake Bay Program is an inter-institutional mechanism for one the major watershed restoration efforts in the United States. The Chesapeake Bay is the largest, most productive estuary in the U.S., but has suffered severe environmental degradation. A major research program during the 1970's led to an action program dealing with nutrient over-enrichment and toxic pollution.

The Chesapeake Bay Program was established in 1983 by the Governors of several states, the administrator of the EPA, and the Chesapeake Bay Commission (representing the legislatures of the states of Maryland, Virginia, Pennsylvania, and the District of Columbia).

The Program is a voluntary, consensus-based effort. It works through a series of committees and advisory committees that guide and advise the program in all aspects of Bay restoration activities. Its governing board, the Chesapeake Executive Council, is comprised of the *Chesapeake Bay Agreement* signatories and meets annually. The EPA represents all federal agencies; 25 agencies and departments participate as Bay Program partners. There are formal advisory committees for citizens, the scientific community, and local governments that serve as sounding boards for program policy and report to the Executive Council at the annual meeting.

A policy level Principals' Staff Committee, which includes the chief environmental and policy representatives of the governors, mayor and Bay Commission meets every six weeks and includes representatives of the Bay Agreement signatories, federal agencies, and chairs of subcommittees and advisory committees [See Figure 5: Chesapeake Bay Program Organizational Structure].[52]

The Chesapeake Bay Program Office manages approximately $19 million annually of federal funds that are distributed by EPA to the states for implementation of Bay restoration activities and to other organizations for scientific research and assessments. It maintains a data center and facilities for scientific research, computer modeling and program implementation. It also coordinates and supports the committee structure. The Bay Program has no

[52] Chesapeake Bay Program, 1999.

independent regulatory authorities and relies on support by the state and local governments and the public to achieve its objectives. [53]

The Chesapeake Bay Program's implementation relies on a committee-based structure for policy guidance and citizen input. On the surface it appears to be a cumbersome mechanism but it does effectively incorporate most stakeholders. [54] The Citizens Advisory Committee (CAC) not only provides feedback to the Implementation Committee and the various sub-committees but it also relates directly to the Executive Committee. The CAC is composed of representatives of different stakeholder groups, e.g. agriculture, NGOs, tourism, electric power, wastewater, who have an interest in the Chesapeake Bay, either because their activities depend on a healthy Bay or because their activities contribute to pollution in the Bay.

The Implementation Committee establishes and coordinates the activities of all of the committees and subcommittees and is responsible for preparing the annual work plan and budget, technical support and public outreach.

Key attributes of the Chesapeake Bay Program are that it: (1) is science-based: (2) includes representatives from all stakeholder groups; (3) has a program that is widely vetted and has achieved a large degree of consensus prior to implementation; and (4) has an active monitoring program that gathers data from a wide variety of sources and makes it readily available to the public (through the world-wide web).

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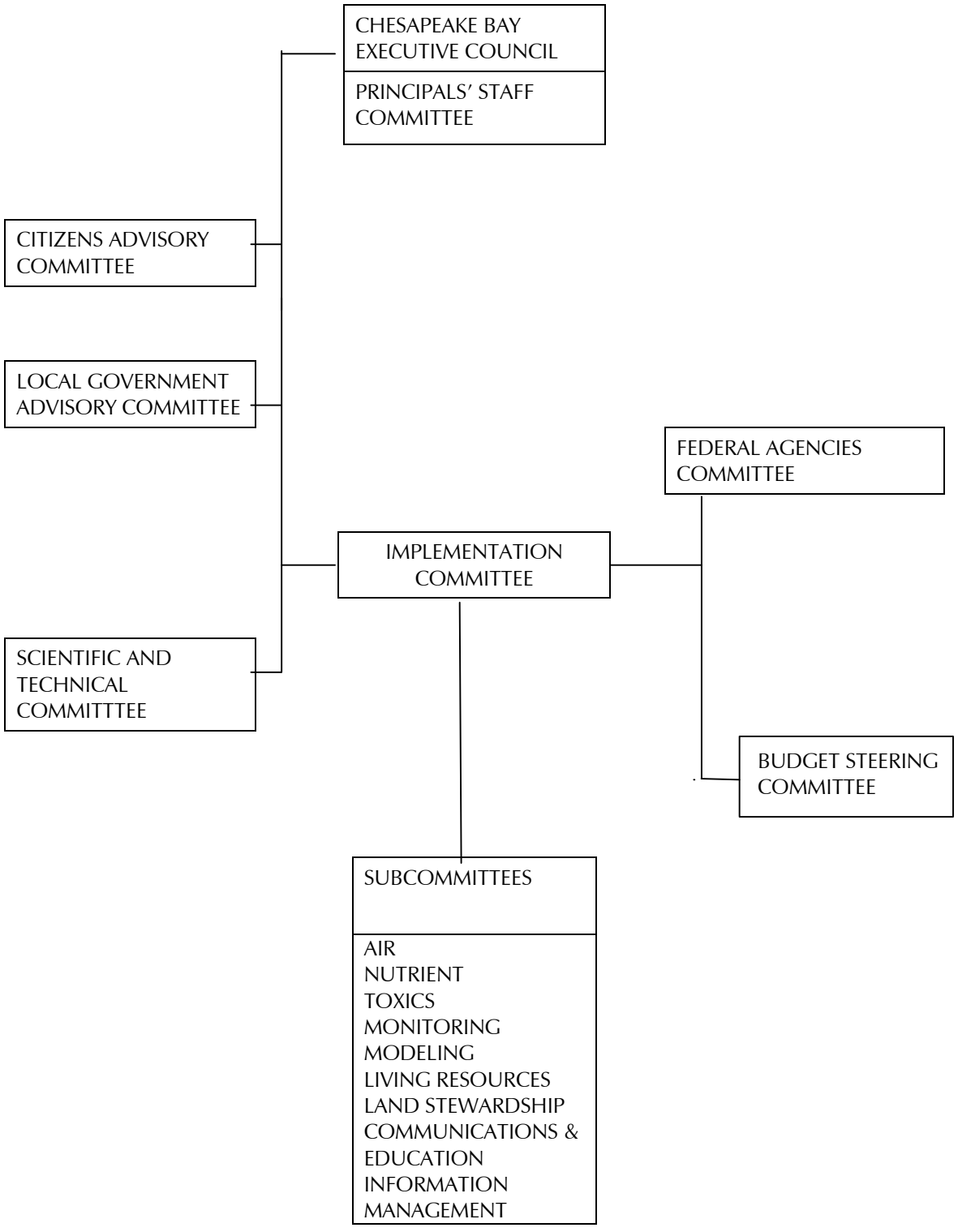
[53] Ibid.

[54] It is important to note that there are two other major organizations that have a strong interest in environmental improvement in the Chesapeake Bay. These are the Alliance for the Chesapeake Bay and the Chesapeake Bay Foundation. The former carries out extensive educational activities. The latter is an NGO that effectively lobbies for environmental improvements in the Chesapeake Bay. These organizations influence the Chesapeake Bay Program indirectly and serve on the Chesapeake Bay Program committee (in the case of the Chesapeake Bay Foundation).

Figure 5 Chesapeake Bay Program Organizational Structure



Tri-State Water Quality Council (TSWQC)

The Tri-State Water Quality Council is a non-profit non-governmental organization that facilitates implementation of water quality improvement programs in a 26,000 square mile watershed in Montana, Idaho, and Washington.

The Tri-State Council evolved from the initiative of citizens and state government employees who saw a need for a comprehensive program to tackle the nutrient pollution issues in the watershed. In 1987 diagnostic studies of the nutrient pollution problem were initiated and technical recommendations for site-specific actions were made in 1993. The Council works on solving problems related to both wastewater treatment and non-point sources of nitrogen and phosphorus (especially livestock production and septic systems).

The Council has two staff members, several long-term consultants, and a decision-making body, the Council with 24 members. The Council includes representatives of major stakeholder groups such as timber, mining, and paper industries, county governments, city governments, environmental groups, soil conservation districts, tribal governments, the U.S. Forest Service, State Departments of Environmental Quality, and independent specialists in water resources. The U.S. Environmental Protection Agency (EPA) technical staff attend the meetings as observers and technical advisors on Federal law.

The Council staff develops meeting agendas, prepares information and policy documents, writes grant-applications and facilitates Council meetings. The Council meets only twice per year, but committees meet regularly, often monthly and do most of the work. The consultants prepare technical analyses, policy documents, and educational programs. The Council bylaws recommend consensus decision-making. Provisions for voting on difficult issues exist in the by-laws but votes are used extremely rarely if at all.

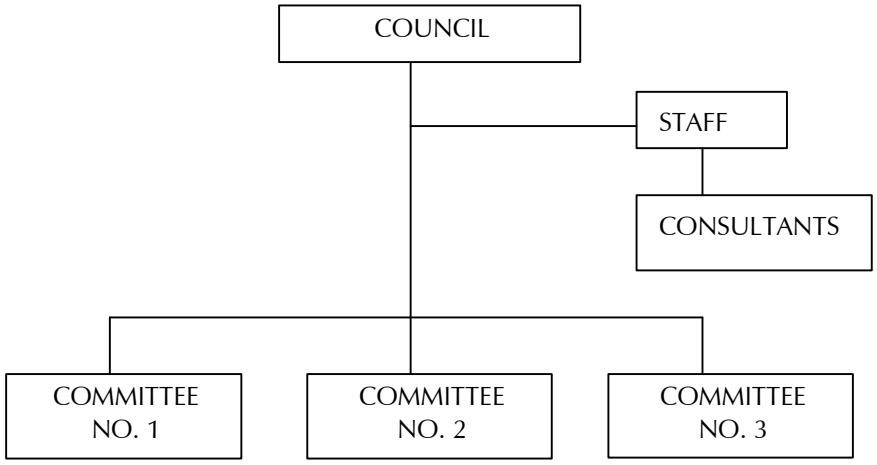
The TSWQC has achieved major accomplishments including an agreement among major nutrient sources (three cities, a county, one paper mill) and environmental interests, to reduce nutrient inflows. This program's goals are expressed as simple, quantitative, science-based water quality targets—reductions of nutrient concentrations and algae in the river. Other activities include: formation of new sewer districts in lakefront communities; development of basin-wide water quality education programs; implementation of a water quality monitoring program in the watershed; and development of a program to

incorporate agricultural/livestock interests and small wastewater treatment plants into a voluntary agreement to control nutrient discharge.

Key elements in the Council's success to date include involvement of important stakeholders on the Council and open public access to all meetings. Council members, who have major responsibilities and authority within their organizations, recognize that the collaborative process allows them to accomplish things that would be difficult or unpleasant or expensive to accomplish through regulations or litigation. Delegation of project implementation to consultants, private firms, and local non-profit organizations allows the Tri-State Council to remain a small, low-budget organization. The Council has independent facilitators who do not represent any stakeholders but who are committed to the overall water quality goals.

Weaknesses include: a weak long-term funding base, with most funds coming from various EPA and State Dept. of Environmental Quality grants, and a small amount of private foundation funds; government employees sometimes find it difficult to support recommendations for policy changes in their own organizations; and the Federal agency providing much of the grant funding has low credibility in some private industry areas.

Figure 6 Organizational Structure of the Tri-State Water Quality Council



Latin American Experiences

Brazil – The Sao Francisco River Valley

The Sao Francisco River flows 2,700 kilometers from central Brazil to the Atlantic Ocean. It contains about 645,000 square kilometers and covers about 7 ½ percent of the total area of Brazil.[55] The Sao Francisco River Basin is an interesting case of continuing efforts over 50 years to use the River Basin as a conceptual construct for planning and management.

In 1946 the [Brazilian] Constitution mandated that the Federal Government draw up and implement an overall plan to develop the economic potential of the Sao Francisco basin.[56] The Sao Francisco Valley Commission was established in 1948 "to regularize river flows, develop the hydroelectric potential, and develop agriculture, irrigation, and industry, among other activities."[57] Subsequently, other organizations were created with similar or overlapping mandates including the Superintendency of Development of the Northeast (SUDENE), the Superintendency of the Sao Francisco Valley, and the Sao Francisco Valley Development Corporation. No less than six commissions and committees were also established over the years.[58] Despite the broad mandates that these organizations were given, they focused on specific sectors, e.g. irrigation, power generation, rather than implementing a multi-sectoral approach. The efforts were carried out by the Federal Government and were never properly oriented, or sizable enough to lead to development or to improve the living conditions of the local communities. They suffered from institutional instability.[59] Simpson as well as Romano and Garcia advocate an integrated management approach. They

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[55]This Section is principally based on Larry D. Simpson, "The Rio Sao Francisco: Lifeline of the Northeast," and Paolo A. Romano and E.A. Catavid Garcia, "Policies for Water Resources Planning and Management of the Sao Francisco River Basin," in A.K. Biswas, et al., Management of Latin American River Basins: Amazon, Plata and Sao Francisco, New York, 1999.

[56] Ibid. p. 245.

[57] Ibid. p. 260.

[58] These include the Committee for Integrated Studies of the Sao Francisco River Basin, the Inter-parliamentary Commission for the Development of the Sao Francisco, and the Special [Senate] Commission for the Development of the Sao Francisco Valley. Romano and Garcia provide brief descriptions of the functions of each of these organizations but they do not specify which continue to exist today, pp. 261-262.

[59] Ibid. p. 246.

identify the characteristics that such an integrated management effort must have, including "more effective participation by communities organized to assume a commitment to decentralization, to engage in partnerships and to change their behaviour and attitudes".[60] Simpson asserts that: "(a) The key to implementation of a [successful] comprehensive programme for the basin will be the development of a strong participatory authority that provides representation of all stakeholders…; (b) the process will require a great deal of consensus building and a strong participatory approach at all levels; (c) the consensus building that will be necessary can only be accomplished if full and transparent information is available to both decision-makers and stakeholders within the basin; and (d) in order for such a programme to be developed and to be sustainable over the long term, sustainable mechanisms for funding the management and administration of the programme."[61]

Colombia -- The Cauca Valley Corporation (CVC)

The Cauca Valley Corporation was established in 1954 based on the recommendation of David Lillienthal, one of the founding members of the Board of directors of the Tennessee Valley Authority. Lillienthal had been a major impetus for TVA's regional development focus. The CVC is an autonomous agency that is intended to function as a mechanism for the integrated and coordinated development of the region's natural resources.[62] Like the TVA it has been very active in developing infrastructure that has been a key element in the growth of the upper Cauca River Basin.

According to Patino the impetus for its creation came from the governing authorities and leading citizens of the region. He points out that the first studies of the region's agricultural potential were done in 1928 and that a number of studies were done in the 1940's related to electricity and irrigation and that these culminated in 1952 with an Economic Development Plan for the upper Cauca River Basin. Based on a diagnostic study of the region the CVC's objectives were established as promotion of economic development; generation, transmission, and distribution of electricity; land improvement and construction of flood control, irrigation, and drainage works; the regulation, administration, conservation, and

[60] Ibid. p. 268.

[61] Simpson, pp. 241-242.

[62] Alberto Patino Mejía, "La Corporación del Valle Del Cauca: Promotora del Desarrollo Rural," in S. Heckadon, 1986. pp. 259-271. This section is based on Patino's article.

development of natural resources including fish, surface and ground water, soil, forests, and wildlife; and the promotions of industrial, agricultural, education, public health, and community action programs.[63] In fact the CVC focused most of its early efforts on hydroelectric generation and on electricity transmission. Agricultural development efforts which were expected to be the principal focus of the CVC lagged because of the difficulties in coordinating with the private land owners. Nevertheless, beginning in the early 1960's some 30,000 hectares have benefited from flood control, irrigation, and drainage works.

The CVC's program was initially financed with a dedicated land tax that was not large but was sufficient to finance technical studies needed to develop projects such as hydroelectric generation that were financed through loans. By 1986 the CVC had a $137 million budget of which 51% was from electricity revenues, 36% from loan resources, 11% from taxes and [aportes-participaciones], and 3% from other sources. These funds were allocated to soil conservation, reforestation, park and reserve management, social promotion, improved land management, infrastructure development, and resource management.

Mexico -- The Lerma-Chapala River Basin Council

The Lerma River – Lake Chapala Basin is one of the most important basins in Mexico. It contains twelve percent of irrigated farmland and more than 35% of industrial GNP. Lake Chapala serves as a water source for, Guadalajara, Mexico's second largest city. However, there are major water problems in the basin including scarcity and unsuitable allocation of water, pollution, inefficiency of water use and environmental degradation.

The Mexican authorities have been addressing these water quantity and water quality issues for more than a decade. In 1989 a Cooperative Agreement was signed among the Governors of the states of Guanajuato, Jalisco, Mexico, Michoacan and Queretaro to develop a Joint Program for the Management of Water Use and Wastewater within the watershed. The objectives of the Cooperative Agreement were: (a) improved water quality; (b) management and regulation of water use to control water volume and make an equitable distribution among users; (c) more efficient use of water; and (d) management and conservation of the watersheds and water flows through activities promoting

[63] Ibid. p 263

increased water infiltration and aquifer recharge, retention of [azolves] and soil conservation. [64]

In 1990 a Consultative Council was created as a result of the Cooperative Agreement. In addition to the five state governments, the Consultative Council had representatives from the Secretariats of Agriculture and Water Resources, Fishing, Health, Public Finance, Social Development and the General Directorates of FertiMex, PEMEX, the Federal Electric Commission and the National Water Commission. In 1992 this Consultative Council was converted into the Lerma-Chapala River Basin Council within the context of the [new] National Water Law.

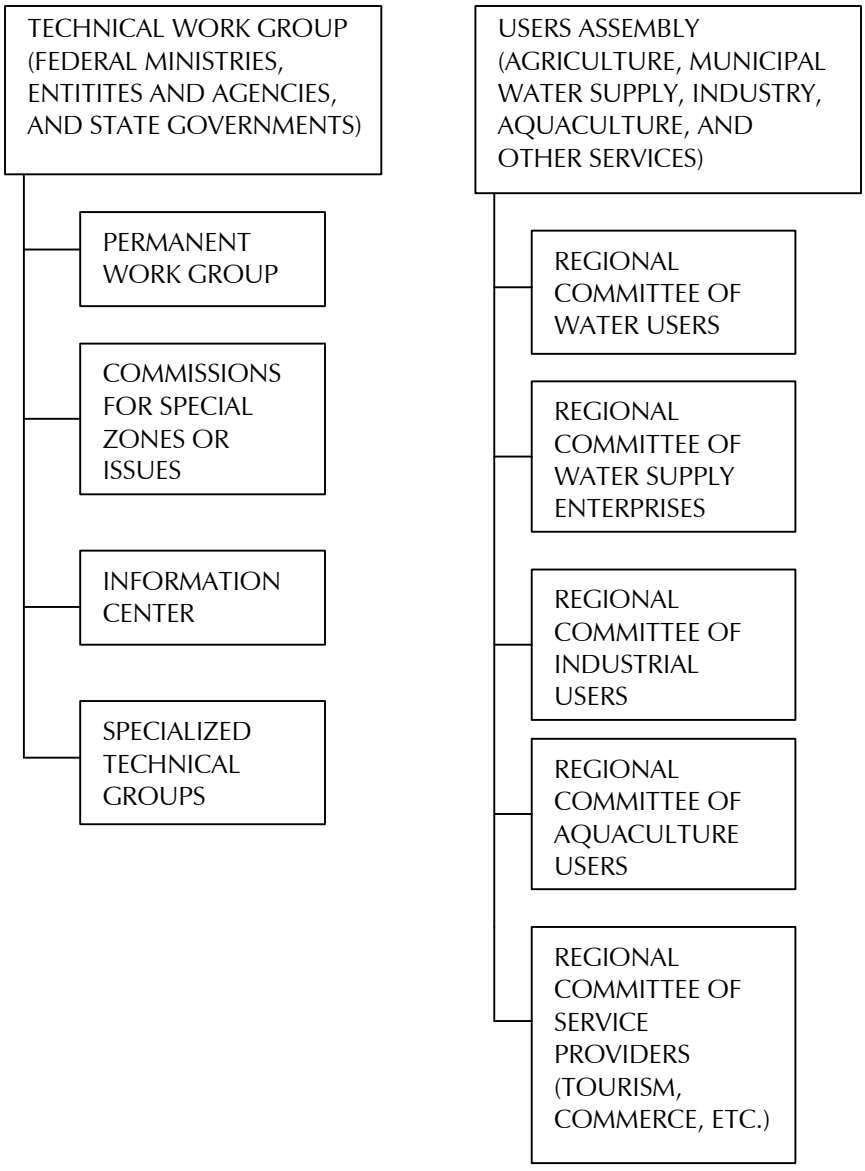
The River Basin Council maintained the participation of the same governmental structures but added six representatives of different water user sectors. According to Mestre the water users have a General Assembly as well as work committees and subcommittees organized by water use and state. Each committee elects its representatives, and in turn the General Assembly elects six water users who serve as official council members.

The River Basin Council has a Technical Work Group (TWG) that meets on a regular basis and that is responsible for implementation. It negotiates resources; coordinates efforts; conciliates different positions; creates legal instruments to support decisions, programs, and actions; and defines the treatment plant program, the surface water allocation policy, and the approaches to enhance water efficiency. The Council has been effective in mobilizing resources. All activities were originally government-run (federal and state government). However, according to Mestre, the experience in terms of multiple coordination, political will, financial instruments, and team spirit has been positive. Many apparently insurmountable problems have been resolved in group work sessions.

Figure 7 presents the structures of the Technical Working Group and the Users Assembly.

[64] See website of the Lerma-Chapala Basin Council for a chronology of the events related to the creation of the Council and implementation of activities. The URL is: http://sparc.ciateq.conacyt.mx~lermaham/consejo.htm.

Figure 7 Lerma-Chapala Basin Council Structure of Technical Work Group and Users Assembly



Watershed/River Basin Management Experiences in Other Countries

France

France has adapted the territorial organization of water management in response to changing socioeconomic circumstances and environmental demands.[65] In 1970 France established six Agences Financieres de Bassin in the six major river basins of France. (Loire, Seine, Somme, Rhine, Rhone, and Garrone). These were situated not only between the central government and local governments but also between water consumers and the water industry.

These Agences had no statutory regulatory functions but served as financial investment agencies. They had the authority to assess mandatory charges for water use and point source pollution discharge permits. The money from these charges is allocated directly to the Agences that then channel the funds to local authority or private water management efforts that contribute to pollution reduction or more efficient water use. Buller notes that, "In this way, the Agences de Bassin have emerged as central players in redistributing the costs of water quantity and quality management and negotiated more balanced water use through financial incentives to water users: higher emission quality or more efficient water use being rewarded by lower discharge or abstraction levies and demonstrable progress towards improvements being rewarded by the possibility of loans or subsidies."[66] Although they lack regulatory powers, the Agences have been effective in negotiating pollution reductions with larger and more identifiable point-source polluters.

Although water supply management has been the responsibility of local authorities or private companies the Agences have become key actors in broad water planning because of their technical expertise.

However the dominant issues have shifted from a focus on the control of discharges and point sources toward water quality standards, the protection of the

[65] This section is based on Henry Buller, "Towards Sustainable Water Management: Catchment Planning in France and Britain," Land Use Policy, Vol. 13, No. 4, 1996, pp. 289-302,

[66] Ibid. p. 291.

aquatic environment and the integrated management of land and water uses. Buller notes that Agences have been less effective here and the system has evolved to focus on smaller catchments. He also notes that land use planning, agricultural land use and water planning have been largely distinct fields in France. Only in a few areas where diffuse pollution sources are a major threat to urban water supplies have efforts been made to regulate land use for water quality control.

In 1992 a "Water Act" enacted by the French parliament redefined the Agences de Bassin as Agence de l'eau; established broad water plans at the major drainage basin level and established a framework for catchment planning. Within the six major drainage basins, 71 catchment commissions were formed. The Law mandated three actions: the definition of hydrologically and/or ecologically viable units; the creation of a local commission composed of all relevant public and private actors; and the establishment of a medium-term (10 years) planning horizon. The local water commissions must include local government representatives (50% of members), water users (25%) and state representatives (25%). While the Agences de l'eau are legally required to develop a medium term (10 to 15 year) plan for integrated management of water resources, at the catchment level the local water commissions planning efforts are discretionary and depend on political will. They are non-binding but involve elaborate public participation and bring together water users (companies), consumers, regulators and policy makers.

Buller notes that, "the key to the success of the [local commissions] will lie in their ability to influence land-based activities that have a direct impact upon water resources and the aquatic environment."[67] He observes that water quality has become the key element of water resources policy in France and that the "new territorialization of water policy enshrined in the [local commissions] and the potential new powers implicitly given to environmental pressure groups by the definition of water quality objectives reveal a shift away from state responsibility towards civil responsibility in achieving and maintaining environmental standards. Their sub-central institutional basis and their territorial rather than administrative focus are arguably more appropriate to the task of developing strategies for sustainable water use. However, if they are to achieve such a goal,

[67] Ibid. p. 298.

they must be able to overcome the resistance of more established administrative and policy-making interests at both the central and the local level."[68]

Institutional issues in Watershed Management.

The cases presented in this document show that watershed management is a broad term that can mean different things to different people. For the CICH to function effectively it must develop a clear statement of its mission and objectives that will help it to define its functions. The cases above present a wide variety of experiences that illustrate a range of objectives, and structures that the CICH may consider as it initiates its own activities.

Scope of Objectives.

The examples of watershed management organizations that are described above often have multiple objectives. However, analysis of these entities shows that they can be disaggregated into organizations that principally have economic development objectives such as the Tennessee Valley Authority and the Cauca Valley Corporation and those that focus principally on environmental objectives such as the Chesapeake Bay Program and the Lerma-Chapala River Basin Council. While the CICH is intended to help preserve the resource base necessary to guarantee the operation of the Panama Canal and the water supply for the Panama and Colon metropolitan areas, it is important that the members of the Commission are in agreement on the fundamental objectives of the CICH. The CICH regulations refer to promotion of the PCW's "sustainable development", as well as the possibility of financing and supervising projects. Both the Ministry of Agricultural Development (MIDA) and the National Environmental Authority (ANAM) are implementing or planning to implement developmental activities such as agro-forestry within the watershed. The CICH needs to define what is meant by "sustainable development"[69] and determine whether or not to promote these programs as priority actions and whether to finance them. Also, while the

[68] Ibid. p. 302.

[69] Sustainable development is often defined as that which "meets the needs of the present without compromising the ability of future generations to meet their own needs." (Brundtland Commission, 1987). Sustainable development is often said to have three dimensions: (1) environmental protection and enhancement; (2) economic development where prices reasonably reflect the cost of resources utilized and developed; and (3) social accountability in which all elements of civil society are properly involved in the decision-making affecting the lives of its members. R. Burack and O. Buros, "Integrated Water Project: Bridging the Gap between Policy and Technology," Water Resources Update, Spring 1999, pp. 70-76.

Regional Plan is fundamentally a land use plan, it has potential major implications for future private and public investments within the watershed.

The decision about the range of objectives will undoubtedly influence the type of organizational structure appropriate for the CICH. Using the framework for management of watershed activities presented in Table 1, the CICH needs to decide whether it wants to assume responsibility for a wide range of environmental management activities that encompass a comprehensive river basin development approach or whether it will have a more limited focus of natural resources management or simply water resources management. The decision taken by the CICH in this regard will have significant implications for how it is structured. The case studies imply that a focus on broad economic development objectives generally requires much more of a "corporate" operational mode and structure such as the TVA and the CVC with direct, proactive intervention by the CICH. A more limited focus on environmental objectives such as water quality and biodiversity can generally be addressed through inter-institutional consultations and consensus-building with implementation undertaken by constituent agencies, e.g. SAMAB, Tri-State Water Quality Council, Lerma-Chapala River Basin Council.

Implementation or Coordination Functions.

The CICH needs to define whether it will be an implementation or a coordination mechanism, although these are not mutually exclusive. It must determine if it will implement activities, either directly or by serving as a funding source for sustainable development or environmental management programs in the PCW or whether it will try to improve resource use by serving as a forum for consensus building among stakeholders and as a mechanism to facilitate coordination of public and private sector resource management policies and programs to reduce conflicts among institutions and/or duplication of efforts.

The concept of "Integrated Watershed Management" is in part a response to the fragmentation of responsibilities among agencies responsible for management decisions. Because watershed management involves both land and water, and often must address both urban and rural problems, multiple organizations may have partial responsibility for taking action. An objective of inter-institutional watershed management organizations is to transcend the partial and sometimes duplicative efforts of those agencies. The challenge for the inter-institutional organization is to offer more benefits than costs to the participating agencies

(which includes at the very least, the time of agency staff may be involved) in inter-institutional efforts. That is, it must be able to mobilize resources unavailable to individual agencies or otherwise facilitate the effectiveness of the agencies in order to not be perceived as an extra, unnecessary bureaucratic layer in program and policy review and approval.

The cases included in this document include a range of organizations from those that undertake direct implementation activities to those that coordinate actions of other agencies. As pointed out in the previous section direct activity implementation implies a more self-contained and hierarchical organization, such as that of the Tennessee Valley Authority or the Cauca Valley Corporation. Those entities that serve as coordination mechanisms generally have a small staff and a horizontal organizational structure.

Types of Decision-Making Processes and Stakeholder Involvement.

There are two prevalent forms of decision-making used by watershed organizations: Formal, "majority rules" decision-making and informal consensus-based decision-making. Many watershed management organizations in the U.S. are using consensus-based decision-making with great effectiveness. Often the consensus-based decision-making is linked to the use of a committee structure that involves representatives from member agencies and, often, representatives of key stakeholder groups.

The value of incorporating stakeholders into the decision-making process of an entity cannot be understated. To the degree that watershed management organizations are able to have stakeholders agree to an overall vision of the organizational objectives, decisions about what specifically needs to be done and how to go about it can be achieved through discussion and consensus-building processes. Ideally, representatives from all major stakeholder groups should be involved, especially where stakeholders may have widely disparate interests.

Recent Mexican and Brazilian experiences highlight the benefits of stakeholder involvement. The Lerma-Chapala River Basin Council has gone to great effort to formally integrate major user groups into the decision-making process. User groups have their own Executive Council that chooses user group representatives to the River Basin Council. They also have sectorally and geographically based committees and sub-committees. In Brazil the National Water Resources

Management Act of 1997 has established that water resources management shall be decentralized and specifically mandates the creation of river basin committees that have stakeholder representation. It also authorizes the creation of water agencies that are the "executive branches of the river basin committees."[70]

There are several issues to consider in stakeholder involvement. Stakeholders benefit from direct access to decision-makers. Ideally stakeholders should be represented on the Board of Directors. Where there is a wide variety of stakeholder groups that preclude full representation at this level, mechanisms for access to decision-makers should be considered. For example, in the Chesapeake Bay Program, the Citizens and Local Government Advisory Committees both have formal access to the Chesapeake Bay Program Executive Committee as well as to the Implementation Committee. The Lerma-Chapala River Basin Council incorporates a significant number or representatives of the users groups directly to the Council. Smaller organizations, e.g. the Tri-State Water Quality Council, have been established through the direct efforts of stakeholders.

Management Information –The Need for Effective Monitoring and Science-based Decision-Making.

The formulation of priorities and selection of courses of action benefits significantly when the problems and issues are clearly understood. As pointed out in the case of the Chesapeake Bay, it is important to have a clear understanding of the "problem" before agreeing to a course of action. But it is also important to monitor the effects of the program. In the case of the Chesapeake Bay, monitoring combined with the application of models has demonstrated that the initial assumptions about Bay pollution, i.e. that it was conveyed to the Bay by surface water, is not entirely correct and that significant levels of pollution are conveyed both from air-borne deposition and through ground water flows.[71] In the Panama Canal Watershed previous monitoring activities have shown that reservoir

[70] M. Porto, R. Porto, and L. Acevedo, "A Participatory Approach to Watershed Management: The Brazilian System," Journal of the American Water Resources Association, June 1999. p. 679. The process of drafting the law benefited from extensive stakeholder involvement. The authors point out that, "stakeholders, researchers, congressmen, public officers and decision-makers intensively discussed the proposed law for about seven years." The result of such extensive debate and public consultation was a bill that reflected the views of the vast majority of stakeholders and interested parties, and represented a compromise among government, users, and other groups of interest."

[71] United State Geological Service, "The Bay's Recovery: How Long Will it Take?", 1998. The USGS now estimates that one quarter of the nitrogen in the Bay comes from air pollution and that 50 percent of the nutrients reaching the Bay travel underground for much of their journey.

sedimentation is less of a problem than many had anticipated but that water quality is declining, possibly rapidly. A high priority for the CICH should be to define the information needed for it to make sound decisions and to then assure that a monitoring program is implemented.

Financing of Watershed Management Activities.

Financing and the development of financing mechanisms is likely to be one the most difficult issues for the CICH. Financing is a major problem that faces most watershed management entities. While some organizations in the U.S., e.g. the TVA and the Chesapeake Bay Program, have benefited from continuing U.S. or State appropriations over extended periods of time, this source of funding is never guaranteed as the TVA has recently learned. Some organizations, such as the Cauca Valley Corporation, have dedicated tax revenues, although these are a minor portion of its budget. Those organizations that implement revenue generation programs, e.g. the TVA, the Cauca Valley Corporation, may dedicate a portion of these revenues to finance other non-revenue activities, competitive pressures may mitigate against this possibility as is the case of TVA's revenues from electricity generation.

In the U.S. a number of watershed management entities obtain grants and/or contracts to finance specific studies and other activities. Inter-institutional entities, e.g. the TSWQC and the SAMAB, may facilitate increased funding for programs implemented by member agencies and often enhance the cost-effectiveness of these programs by reducing duplication and/or sharing information.

In France the six basin agencies collect users fees both for water consumption and for point source pollution permits. These fees are then channeled into water resource enhancement activities undertaken by local governments or the private sector. The new Brazilian Water Law explicitly recognizes that water is an economic good that has a value. Some Brazilian states have begun to charge water users, e.g. potable water utilities, a fee for taking raw water. These fees are then reinvested in water. This approach recognizes that the funding required for environmental services ultimately must come from the users of the service. Ultimately, it may represent the best long-term financing solution for watershed management and protection.

Synthesis of Experiences: Lessons Learned and Conclusions for the CICH

The CICH has to undertake several major organizational tasks. The case studies are intended to stimulate debate and discussion among the CICH members and other stakeholders about the best way to organize itself. There is no one specific organizational structure that will assure the success of the CICH. Nevertheless, there are a number of conclusions which are relevant to the CICH that can be drawn from the case studies. Key conclusions are:

- Context matters. The CICH must not only consider the socio-economic and environmental context, but must also consider other factors such as demographics, governmental and legal structures, and the political environment.

- Objectives need to be well-defined and agreed upon by all key stakeholders. The process of achieving a consensus about objectives may take some time. However, at the end of such a process a formal "Mission statement" or Compact that all key stakeholders sign can be developed. This written commitment by stakeholders may facilitate the success of the CICH.

- Functions flow from objectives and direct actions and activities. The greater number of functions that a watershed management entity assumes, the more likely it is to ignore or fail to carry out many of them. A new entity should start out with relatively few functions. It will evolve over time and may add functions. In terms of "integrated" management, most agencies have more success in dealing with water issues, such as water allocation and point source pollution control, than with land-based issues such as non-point source pollution that may require land use changes.

- The structure of an agency with program implementation responsibilities may have some "verticality" but an effective structure for an inter-institutional watershed management entity should be flat and should include member agencies and other stakeholders in the decision-making process.

- An entity such as the CICH that has a number of natural resources management agencies as members will need to assure that its member organizations actually benefit from its creation. If it does not provide "value-added," it will be seen by these agencies as another layer of bureaucracy that is competing for scarce resources and they will lack commitment to helping achieve its objectives.

- The Executive Director (of the Technical Secretariat) of an inter-institutional entity must be seen as impartial and not beholden to one of the member agencies even if that agency contributes the major part of the inter-institutional entity's operating funds. Major roles for an executive director include facilitation of shared information and resources.

- The decision-making process must be based on sound scientific, technical and economic analysis as well as on continuous monitoring. This not only helps reinforce the watershed management entity's credibility, it increases the likelihood that programs will address priority issues and reduce unwarranted expenditures.

- The "public," including basin residents and users of water services, must have an input into the watershed management entity's decision-making process.

- Finances will inevitably be a major concern. However, some inter-institutional watershed management entities have been able to improve the cost-effectiveness of participating agency programs and have not required a significant level of additional resources for their operation.

- Effective watershed management entities, especially those that deal with basins covering large areas are often most effective when they initiate programs in smaller catchments within the basin. Normally, the catchments are selected because they are the most critical, either from the standpoint of water quantity or of water quality. In the Panama Canal Watershed, the Upper Chagres catchment would be more critical than the catchments that feed directly into Lake Gatun.

Annex A ACP Environmental Regulations that Pertain to the Interinstitutional Commission for the Panama Canal Watershed

"Article 38. The Inter-institutional Commission for the Panama Canal Watershed is created as an organization attached to the Canal Authority and is subject to its coordination and guidance. The objective of the Commission is to integrate efforts, initiatives and resources for the conservation and management of the Canal Watershed and to promote its sustainable development.

Article 39. The Commission will be presided over by the Canal Authority Administrator or his designee and will be composed of the following additional organizations: The Ministry of Government and Justice; the Ministry of Housing; the Ministry of Agricultural Development; the National Environmental Authority; the Interoceanic Regional Authority; and two representatives of non-governmental organizations with interests in the Watershed. The Minister, Director or Administrator or his designee will represent the governmental organizations. The members designated by the Board of Directors on the basis of their merits, experience and prior works will represent the non-governmental organizations. The members of the Commission will not receive salaries, representation expenses, or per diems for their services.

Article 40. The Commission functions are to:

- Establish a coordination mechanism among the organizations that develop activities in the Watershed.
- Establish through the Authority and with its coordination and supervision, a mechanism or system of financing and administration of economic resources for the operation of the Commission and the authorized projects that the Commission considers being pertinent.
- Supervise the programs, projects and policies necessary for the adequate management of the Watershed in order to assure that the potentially negative impacts be minimized.
- Evaluate the programs, projects, and policies that exist or are being planned in the Watershed, in order to resolve possible incongruencies or duplication.

- Establish an environmental information center for the Watershed that also includes information about the projects and programs that are being developed in it.

Article 41. The projects that may be undertaken in the Watershed must be coordinated by the competent authorities who will follow-up and periodically report to the Commission their progress, giving more emphasis to the mitigation measures identified in the environmental impact studies. Each member of the Commission will designate a representative to follow-up the implementation and installation of programs, projects and activities agreed upon by the Commission.

Article 42. The Commission will solicit and obtain through the Authority assistance and technical and financial cooperation of national or international organizations for the elaboration and development of projects.

Article 43. The Commission will be subject to the financial controls and procedures established by the Authority.

Article 44. The Canal Authority will provide the administrative support necessary for the fulfillment of the functions of the Commission.

Article 45. The Commission will adopt its internal procedures and will submit its operational structure to the Board of Directors.

Article 46. This regulation will enter into force at twelve noon on December 31, 1999."

Annex B Tennessee Valley Authority Case Study

The Tennessee Valley (TVA) is the first successful and perhaps the most widely imitated and influential example of comprehensive river basin development and management. The World Bank sponsored a seminar and has published a Technical Paper on the TVA experience.[72] The TVA was established as a Federal Corporation by the U.S. Congress in 1933 with the objective of "planning for the proper use, conservation, and development of the natural resources of the

[72] Barbara Miller and Richard Reidinger, "Comprehensive River Basin Development: The Tennessee Valley Authority," World Bank Technical Paper No. 416, 1998. The section of the paper on the TVA experience relies heavily on the analysis contained in the paper by Miller and Reidinger.

Tennessee River Drainage basin….". It was created during an era of active federal government efforts to reactivate the economy through public sector programs. The Tennessee River Valley is a large area of 106,000 sq. Km. The context for the creation of the TVA was that the Tennessee Valley in the early 1930's was one of the poorest and most isolated regions in the U.S., primarily rural with a highly degraded land base. The TVA also was created in the midst of the great depression when the Federal government became much more proactive in undertaking public works activities that both enhanced the resource base and provided employment. The TVA has successfully fulfilled its principle objective of "jump-starting" regional economic growth. It has had a major impact on the region and arguably is principally responsible for the economic growth and improvement in the standard of living that occurred in the Tennessee Valley. Between 1933 and 1945 the "TVA established its institutional framework, built broad-based local support, and constructed a physical infrastructure… [that] included a vast system of multipurpose dams and reservoirs to harness the Tennessee River and an extensive transmission system to provide cheap electricity throughout the region. Early and intense efforts to improve agriculture, land use, and forestry practices helped to restore and maintain a healthy environmental base, while access to small-scale credit and technical assistance programs provided the citizens of the Valley with the tools to improve their own lives."[73] Thus, the TVA historically functioned as an infrastructure planning, construction and operation body. . The TVA built 54 dams and reservoirs that serve flood control, navigation and electric power generation functions. In its early years it exercised considerable autonomy in decision-making, although some of its programs, e.g. soil conservation, were implemented through cooperative efforts with other governmental agencies. Many people are unaware of the importance of the TVA in soil as well as water management, especially during its early history. According to Malcolm Newson the term "watershed management" was first used in conjunction with TVA programs.[74] Today, however, the TVA has evolved principally into an electric power-generating and transmission agency.

Miller and Reidinger attribute the success of the TVA during it's early years to five factors: need, champions, opportunity, vision, and tangible results. The creation and financing of the TVA through the federal budgetary process was the result of strong political leadership, principally President Franklin Roosevelt,

[73] Ibid. p. 1.

[74] Malcolm Newson, Land, Water and Development (2nd Ed.), Routledge, New York, 1997, p. 108

Senator George Norris, and Gifford Pinchot. Successful program implementation was in large part due to three visionary TVA board members who promoted the concepts of regional planning, the achievement of grassroots agricultural change through existing state and local agencies, and the need for accessible, low-cost electricity.[75]

For most of its history the TVA was structured to have an appointed board with three directors, a general manager, and autonomous operating divisions including power, natural resources (including water) and construction/engineering. According to Miller and Reidinger this structure has kept the TVA "action-oriented and grounded in doing real things to directly improve people's lives" but was most successful prior to the 1950's when large-scale construction projects were under way. Subsequently, this institutional structure has been less successful because there is "no formalized mechanism for stakeholder participation in decision-making."[76] Muckleston asserts that the inability to replicate the TVA experiment in other parts of the country largely resulted from TVA's conflict with state governments and federal agencies with resented the usurpation of their powers by this regional organization."[77] The TVA has very limited responsibility for land management. Most of the basin is in private hands or belongs to other agencies. However, the TVA does have extensive data collection and analysis capabilities that it shares with other agencies. It has environmental education and outreach programs for the public.

The Tennessee Valley Authority (TVA) has a hierarchical structure that reflects its functions as an implementing agency. While the TVA structure has evolved over its history -- the General Manager position has been eliminated, it has always been more vertical than horizontal. TABLE II shows the structure as it is currently conformed.

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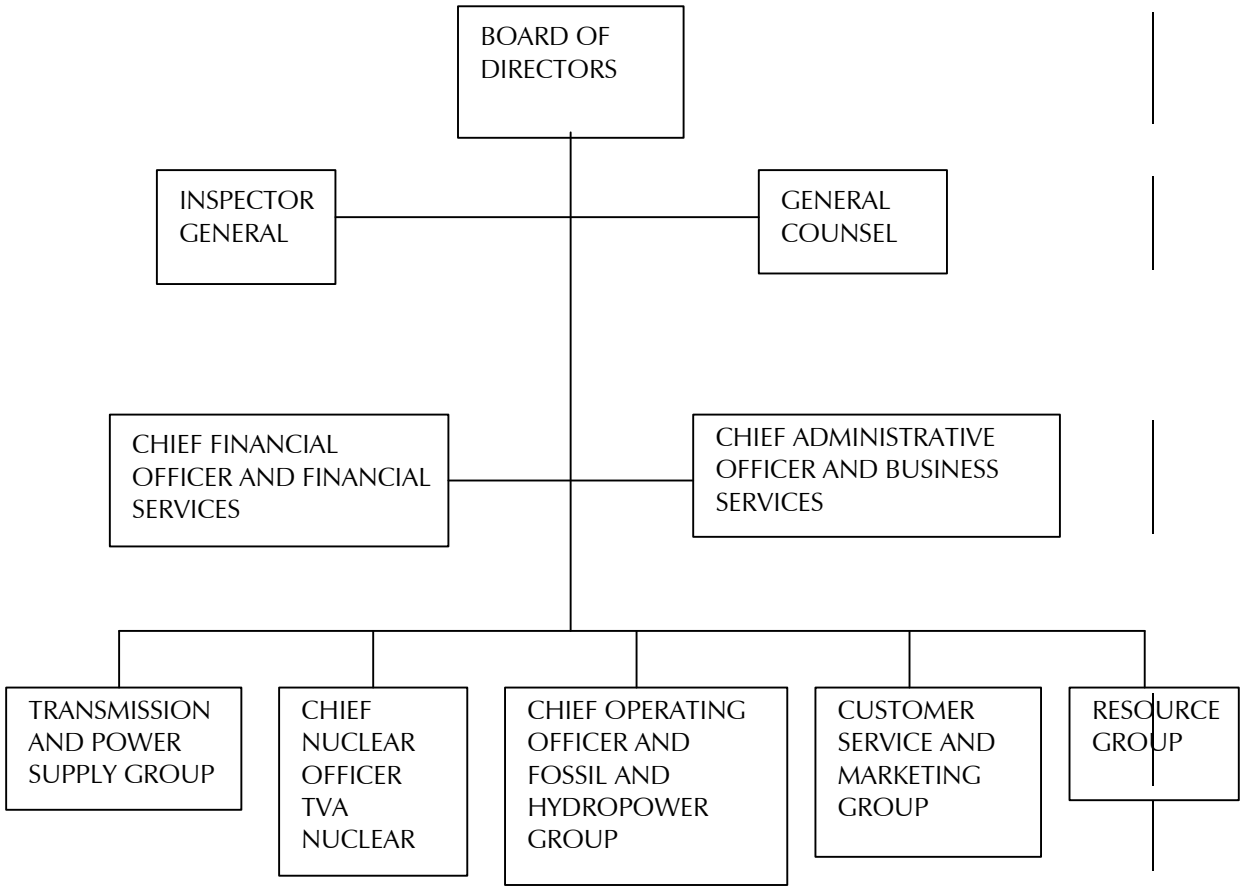
[75] Miller and Reidinger, p. .

[76] Ibid. p. 7.

[77] Muckleston, p. 36.

Table 1 Organization of the Tennessee Valley Authority



In recent years the TVA has begun to adopt a different operating style for some of its operations, specifically the resource protection programs. It has established "Watershed Action Teams" to work with states and local communities to "protect shorelines, conserve fisheries and maintain water quality." The TVA is involved in two important environmental management programs. These are: (1) a lake improvement plan to improve aquatic habitat by assuring adequate minimum water flows through its dams and operating aeration systems at 16 dams to increase dissolved oxygen and, (2) a clean water initiative aimed at building community-based partnerships for watershed restoration. The Watershed Action Teams are involved in the later activity in each of the basin's 12 watersheds. The stated purpose of these teams is to "provide information about resources conditions and potential solutions; engage local organizations and citizens; enhance collaboration among local, state, and federal agencies; and create incentives for voluntary adoption of conservation measures.[78] In 1998 TVA worked with more than 50 volunteer groups and coalitions to implement about 150 pollution reduction activities including stabilization of more than 24 miles of streambanks and remove more than 4,000 tons of waste from streambanks.

TVA operations historically were funded through revenues generated from the power program and funds from the U.S. budget appropriated by Congress, primarily for resource management. The electric power program generates revenues of $6.7 billion /year through power sales to 159 local power distributors. [Only 19 percent of TVA's power is generated from hydro-electricity; the majority is thermal generation followed by nuclear power.] For many years there was sufficiently strong political support in Congress to assure the availability of appropriated funds for flood control, navigation, recreation, water quality, aquatic habitat and other resource management activities. In the 1990's this funding ranged from $90 to $140 million but diminished to $70 million and was eliminated in 1999. Currently, all of its programs are paid for through power revenues. Because of the on-going deregulation of the U.S. power industry the TVA has been forced to operate its power program more efficiently that has resulted in a substantial reduction in its labor force. Deregulation has helped highlight a dichotomy between its roles as a multipurpose authority and power generation/transmission, which has caused tension within the TVA.[79] In 1997 the TVA chairman proposed to "spin-off" TVA's non-power programs in order to for

[78] TVA "Clean Water Action Plan: One Year Later"

[79] Miller and Reidinger,. p. 3

it to compete more effectively in a deregulated energy environment. While Congress rejected this proposal, it illustrates the difficulty in assuring continuing financing for non-revenue generating programs. Miller and Reidinger point out that, "while nonpower activities like flood control and environmental protection provide immense benefits to the region, they are not self-financing or revenue generators. The long term sustainability of agencies like the TVA will depend upon finding innovative ways to finance resource management activities."

Annex C The Southern Appalachian Man and the Biosphere Program (SAMAB)

The Southern Appalachian Man and the Biosphere Program (SAMAB) is a multi-institutional voluntary integrated resource management program.. The SAMAB program covers a "zone of cooperation" in the Appalachian mountain parts of six states: Tennessee, North Carolina, South Carolina, Georgia, Alabama, and Virginia. It includes specific geographic units such as parks and nature preserves. It is delineated on the basis of physiographic regions, rather than on watersheds.

The SAMAB is intended to be an organization that serves as "model of cooperative, integrated regional resource management."[80] Much of its effort is intended to make the programs of its member agencies more cost-effective through enhanced coordination and reduced duplication of efforts. In some cases it implements multi-institutional activities by pooling participating agency resources.

Its initial focus was primarily on biological resources and biodiversity (native plants and exotic pests) but it began to focus on sustainable development soon after it was created, principally through the development if GIS systems and community-based monitoring activities. It also focuses on watershed management through the development of a watershed conservation clearinghouse that helps coordinate and share information among activities of participating agencies, e.g. the TVA clean water initiative. "The SAMAB program places major emphasis on

[80] Most information from this section has been obtained from the SAMAB website [http://sunsite.utk.edu/samab] and from a conversation with Dr. Robert Turner, SAMAB Executive Director.

the development of strong public-private partnerships for both funding and decision-making."[81]

The Man and the Biosphere Program was established in 1971 by the United Nations Scientific, Educational, and Cultural Organization (UNESCO) to promote a balance between conservation of biological diversity consonant with economic development and cultural values. In 1976 UNESCO designated 59 biosphere reserves throughout the world including the Smoky Mountains National Park and the Coweeta Hydrological Laboratory. In 1986 the US Man and the Biosphere National Committee endorsed the Southern Appalachian Biosphere Reserve as a model biosphere reserve regional project. In 1988 six U.S. federal agencies including the TVA as well as the U.S. Park Service and the U.S. Forest Service, signed an "Interagency and Cooperative Agreement for the Establishment and Operation of the "Southern Appalachian Man and the Biosphere Cooperative." [Today 11 federal agencies and three state environmental/natural resources agencies are members of the Cooperative].

The SAMAB vision is to "promote the achievement of a sustainable balance between the conservation of biological diversity compatible economic uses and cultural values across the Southern Appalachians. This balance will be achieved by collaborating with stakeholders through information gathering and sharing, integrated assessments, and demonstration projects directed toward the solution of critical regional issues."[82] One of the first undertakings of SAMAB was a comprehensive Southern Appalachian Assessment which "assembled existing data and evaluated past trends, current conditions, and future risks to the economic, ecological and cultural resources of the region." The assessment has been instrumental in helping participating agencies to set the SAMAB program priorities and in ratifying or modifying their own program efforts. All three of the SAMAB priorities – native plants and invasive species, sustainable development, and watershed management – flow from the findings of the assessment.

The philosophy of SAMAB is to use the biosphere reserve units as proving grounds for ecological research and monitoring and extending the "lessons learned" from these reserves to the surrounding Zone of Cooperation through voluntary community projects. This approach is one which combines a focus on critical issues with targets of opportunity generated by local concerns. It is not

[81] Ibid.

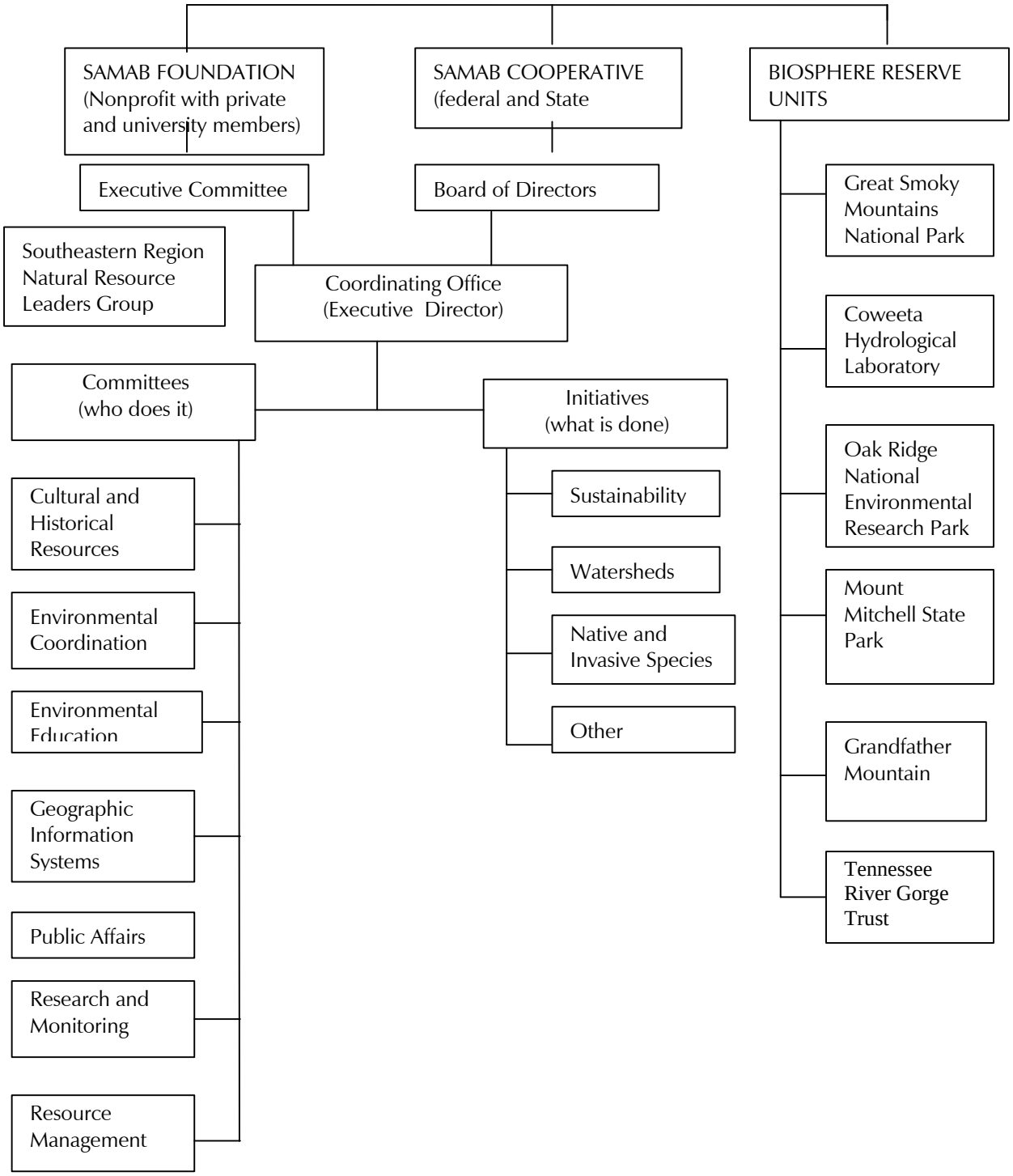
[82] Ibid.

intended to be a "comprehensive" program, either geographically or in terms of scope. In this sense it also differs markedly from the TVA.

The SAMAB program organizational structure consists of two entities: The SAMAB Cooperative (composed of the federal and state agencies) and the SAMAB Foundation.[83] The latter entity was created as a non-profit fund-raising organization in 1988 as a complement to the SAMAB Cooperative It is composed of non-governmental organizations, private industry, universities and colleges, and local communities. The Cooperative and the Foundation work together to identify natural resource and development issues; and, together or separately, they develop the means for addressing these issues.

[83] A third organization, the SAMAB Consortium, composed of Universities and Colleges, is planned.

Figure 1 SAMAB Program Organizational Structure



The SAMAB Cooperative office is staffed with a full time executive director and some part time support staff but much of the program development and implementation is undertaken through seven committees made up of representatives from both the public and private sectors. The committees use a consensus-based decision-making process. The seven committees are research and monitoring, resources management, sustainable development, cultural and historical resources, environmental education, geographic information systems, and public affairs. SAMAB has undertaken cooperative projects/programs in each subject area as follows:

- environmental monitoring and assessment -- the Southern Appalachian Assessment of the economic, ecological and cultural resources of the region, forest health monitoring, and research on landscape ecological modeling and analysis;

- sustainable development -- community strategic planning and community outreach programs;

- resources management -- workshops to clarify local interest, data needs and opportunities for sustainable economic development of biological resources and a Southern Appalachian Mountain Initiative to address air quality problems;

- cultural and historical resources -- workshops to develop a cooperative program to preserve and promote regional cultural resources;

- environmental education -- videos, posters and teacher guides ere produced and distributed to schools in the zone of cooperation.

- Geographic information systems – a Regional Information System that is accessible on-line by local communities and anyone else that desires access through a web-based server is under development. GIS capability is built in by use of internet map servers.[84]

- public information -- a newsletter is disseminated, semi-annual conferences are conducted and a web page is maintained on the Internet.

Committee membership is composed of representatives from both the public and private sectors. Private sector members are generally volunteers who are

[84] This may represent a good model for the development of the PCW data network.

interested in serving on the committee. Often they are faculty at universities and colleges. The key to the success of the SAMAB program is the use of the committee structure to identify issues and develop programs and activities. The Executive Director functions principally as a facilitator and works with participating agencies to obtain resources for programs.

SAMAB has focused extensively on building support among its stakeholders. This has been necessary because SAMAB does not have appropriated funds. One example of a major outreach effort to stakeholders is the Community Sustainability Indicators Workshop that was held in 1997. The workshop brought together representatives from seven communities in North Carolina, Tennessee and Virginia to determine meaningful indicators of change and community development. The workshop participants identified the most urgent issues that their communities faced. They also where exposed to the data contained in the GIS and were asked to review of list of 200 indicators in order to select those that were most important and useful for their communities. Many of these indicators could be derived from the GIS database but the database will be modified to incorporate other indicators into the Regional Information System. The Community Sustainability Workshop has influenced EPA and, to some degree, U.S. forest service programs

Funding is a major concern for SAMAB and it will continue in the future. While there is some direct funding --eight of the fourteen participating agencies contribute from 10 to 24 thousand dollars annually-- for the Coordinating Office expenses, specific programs/projects must be funded through pooled funds from the cooperating agencies and/or from in-kind services, principally of staff serving on committees or working on projects. The SAMAB Cooperative Executive Committee is charged with generating funds and in-kind services. These generally come from local agency managers or regional offices. There are often program efficiencies obtained through sharing of information and elimination of redundant efforts that benefit cooperating agencies. Hence, local managers are willing to support SAMAB programs/projects but they have limit flexibility in redirecting funds and personnel. SAMAB lacks a reliable long-term financial base.

While an objective of the SAMAB Foundation is to help raise funds, it has not been successful in ranging enough funds to significantly support regional projects. The foundation was initially a membership-based organization that received contributions from its members. It has obtained some grant funds and has recently hired a fund raiser to increase its funding base.

Funding is likely to continue to be a key issue for the SAMAB program, which must continue to demonstrate significant results on a cost-effective basis and to effectively reach out to stakeholders in order to assure its own long-term sustainability. However, the tight budgetary constraint has a positive effect in that SAMAB activities must be demonstrably useful to the stakeholders, especially the participating agencies. The limited resource base contributes to SAMAB's success.[85]

Despite its funding constraints the SAMAB is an effective organization that had developed an organizational structure and program approach that are consonant with its ability to mobilize resources. The "outreach" approach offers an opportunity for program growth as successful activities become more widely know and as stakeholder interest grows. The Regional Information System is a specific example that

Annex D The Chesapeake Bay Program

The Chesapeake Bay Program is a well developed inter-institutional mechanism for one the major ongoing watershed restoration efforts in the United States. The Chesapeake by is the largest and most productive estuary in the U.S. but one that has suffered major environmental degradation. As the result of a major research program during the 1970's, an action program dealing with nutrient over-enrichment, underwater bay grasses, and toxic pollution was developed and implemented.

The Chesapeake Bay Program was established in 1983 through the signature of the *CHESAPEAKE BAY AGREEMENT* by the Governors of Maryland, Virginia, Pennsylvania, the mayor of the District of Columbia, the administrator of the EPA, and the chair of the Chesapeake Bay Commission that represents the state legislatures of the aforementioned states.

Chesapeake Bay Program documentation describes the Bay Program as, "a voluntary, consensus-based effort. The Bay Program carries out its work through a series of committees, advisory committees and subcommittees which guide and advise the program in all aspects of Bay restoration activities. The chief governing board of the program, the Chesapeake Executive Council, is comprised

[85] This observation was made by R. Turner.

of the *Chesapeake Bay Agreement* signatories and meets annually. EPA represents all federal agencies, and currently, there are 25 agencies and departments participating as Bay Program partners. Formal advisory committees for citizens, the scientific community, and local governments serve as sounding boards for program policy and report to the Executive Council at the annual meeting. A policy level Principals' Staff Committee, which includes the chief environmental and policy representatives of the governors, mayor and Bay Commission, and the Implementation Committee which meets every six weeks and includes representatives of the BAY Agreement signatories, federal agencies, and chairs of subcommittees and advisory committees [See Table I: Chesapeake Bay Program Organizational Structure]."[86]

EPA's Chesapeake Bay Program Office manages approximately $19 million annually of federal funds that are distributed to states for implementation of Bay restoration activities and to other organizations for scientific research and assessments. The Bay Program Office maintains a data center, and facilities for scientific research, computer modeling and program implementation. It also coordinates and supports the committee structure. The Bay Program has no independent regulatory authorities and relies support by the state and local governments and the public to achieve its objectives. [87]

The Chesapeake Bay Program's implementation relies on a complex committee-based for policy guidance and citizen input. On the surface it appears to be a cumbersome mechanism but it does effectively incorporate most stakeholders. [88] It is particularly useful to note that the Citizens Advisory Committee (CAC) not only is intended to provide feedback to the Implementation Committee and the various sub-committees but also relates directly to the Executive Committee. The CAC is composed of representatives of different stakeholder groups, e.g. agriculture, NGOs, tourism, electric power, wastewater, who have an interest in the Chesapeake Bay, either because their activities depend on a healthy Bay or because their activities contribute to pollution in the Bay.

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[86] Chesapeake Bay Program. 1999.

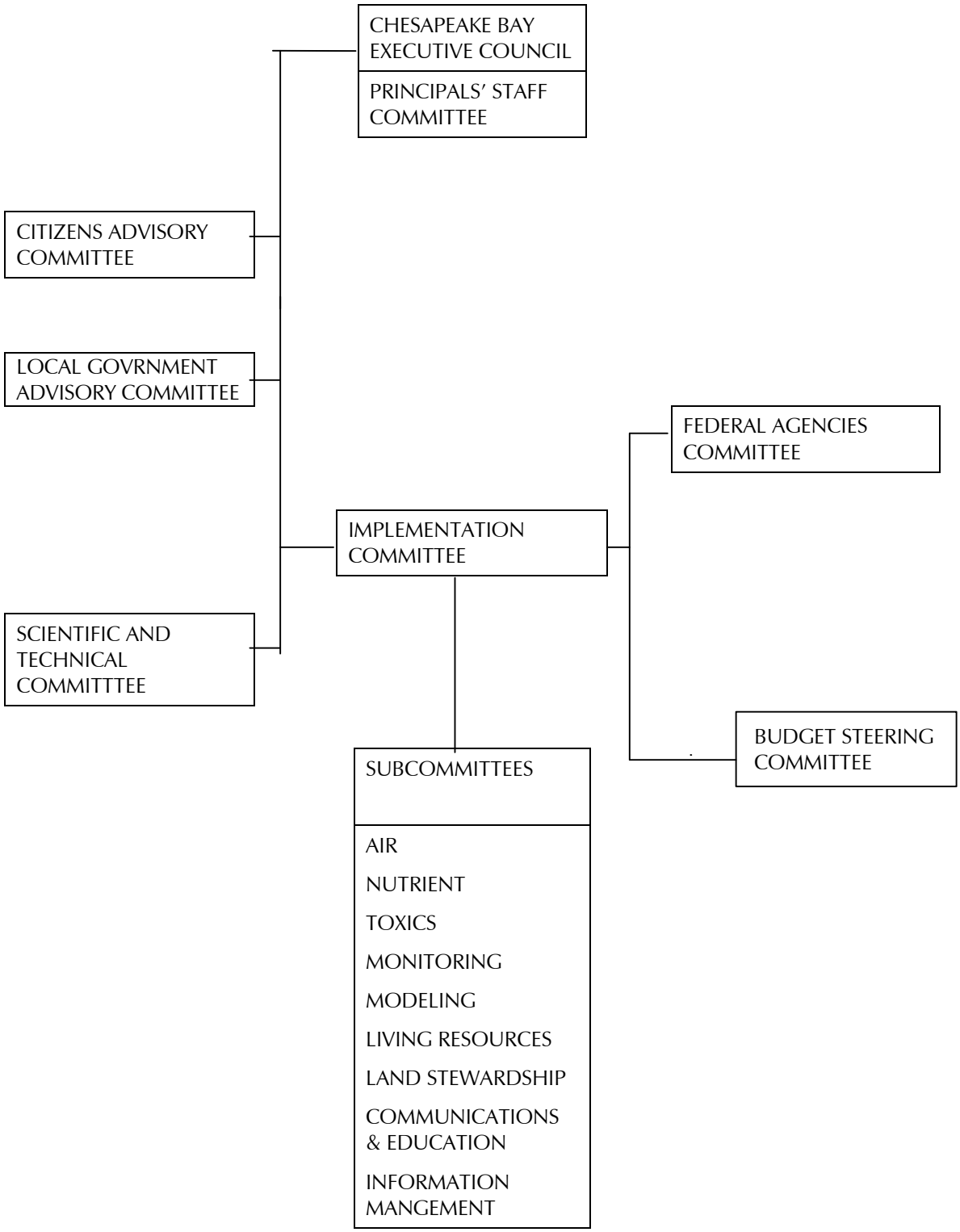
[87] Ibid.

[88] It is important to note that there are two other major organizations that have a strong interest in environmental improvement in the Chesapeake Bay. These are the Alliance for the Chesapeake Bay and the Chesapeake Bay Foundation. The former carries out extensive educational activities. The latter is an NGO that effectively lobbies for environmental improvements in the Chesapeake Bay. These organizations influence the Chesapeake Bay Program indirectly and serve on the Chesapeake Bay Program committee (in the case of the Chesapeake Bay Foundation).

The Implementation Committee establishes and coordinates the activities of all of the committees and subcommittees and is responsible for preparing the annual work plan and budget, technical support and public outreach. The Chairs of the CAC as well as the Technical Advisory Committee and the Local Government Advisory Committee are members as are representatives of various state and federal agencies that work on Chesapeake Bay matters, as well as the River Basin Commissions.

Key attributes of the Chesapeake Bay Program are that it: (1) is science-based: (2) includes representatives from all stakeholder groups; (3) has a program that is widely vetted and has achieved a large degree of consensus prior to implementation; and (4) has an active monitoring program that gathers data from a wide variety of sources and makes it readily available to the public (through the world-wide web).

Figure 2 Chesapeake Bay Program Organizational Structure



Annex E The Tri-State Water Quality Council[89]

The Tri-State Water Quality Council (TSWQC) is a non-profit organization that facilitates the implementation of water quality improvement programs in the Clark Fork-Pend Oreille watershed. The watershed includes 26,000 sq. miles in Montana, Idaho, and Washington states, in the upper Columbia River Basin. The watershed includes nationally known trout fisheries and recreation areas, four major hydroelectric facilities, important livestock, mining, timber and paper industries, and some of the fastest-growing counties and towns in Montana.

The key issues being addressed by the Tri-State Council are nutrient pollution and related blooms of algae and aquatic plants that are altering the ecology of local rivers, and threatening the high water quality of Lake Pend Oreille. The Council works on solving problems related to both wastewater treatment and non-point sources of nitrogen and phosphorus (especially livestock production and septic systems).

The Tri-State Council evolved from the initiative of dedicated citizens and state government employees who were concerned about the need for a comprehensive program to tackle the nutrient pollution issues in the watershed. In 1987 the local Congressional representatives inserted special language, called Section 525, into the Clean Water Act appropriating money to Montana, Idaho, and Washington for diagnostic studies of the nutrient pollution problem. The results of several years of field studies were analyzed and technical recommendations for site-specific actions were made in 1993. The Tri-State Council was established in 1993 as a means of implementing these recommendations through a **citizen-driven process**.

The Tri-State Council has two staff members, several long-term consultants, and a decision-making body, the Council, which has 24 members. Members of the Council include representatives of major stakeholder groups, including the timber, mining, and paper industries, the county governments, city governments, environmental groups, soil and water conservation districts, tribal governments, US Forest Service, the three State Departments of Environmental Quality, the Natural Resources Conservation Service, and independent specialists in water resources. The U.S. Environmental Protection Agency (EPA) technical staff attends the meetings as observers and technical advisors on Federal law.

[89] This section was prepared by Will McDowell.

The Tri-State Council staff develops meeting agendas, prepares information and policy documents, writes grants to fund TSWQC initiatives, and facilitates Council meetings. The entire Council meets only twice per year but committees that meet more regularly, often monthly do most of the work. The committees supervise consultants who prepare technical analyses, policy documents, and educational programs. Active committees include the Clark Fork Nutrient Target subcommittee, the Monitoring subcommittee, and the Lake Pend Oreille local sewers committee, etc. State government regulatory personnel participate actively in the committees, whose work is also facilitated by TSWQC staff. Committees and the entire Council have bylaws that recommend **consensus decision-making**. Provisions for voting on difficult issues exist in the by-laws, which encourages consensus, and discourages "hold-outs." Votes are used extremely rarely if at all.

The TSWQC has facilitated several major accomplishments:

- (a) The Clark Fork River Voluntary Nutrient Reduction Program (VNRP) is an agreement among five major nutrient sources (three cities, a county, one paper mill) and environmental interests, to reduce nutrient inflows over a 10-year period. This agreement required substantial scientific study and several years of negotiation. It has resulted in the commitment of $85 million in local government and industry funds for pollution control (upgrading sewage treatment plants, installing sewers in neighborhoods that now have on septic systems, applying treated wastewater to agricultural fields). The Program's goals are expressed as simple, quantitative, science-based water quality targets—nutrient concentrations and algae in the river.

- (b) Formation of new sewer districts in lakefront communities of Lake Pend Oreille, Idaho to reduce septic leakage to the Lake.

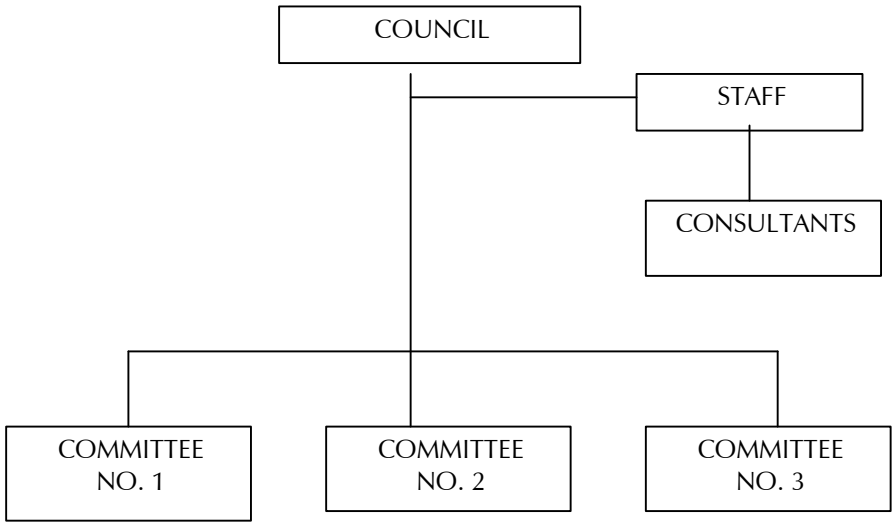
- (c) Development of basin-wide educational programs on water quality. The Council has funded several publications and the development of an original packet of educational materials (books, pamphlets, maps, etc.) for use in the local schools.

- (d) Implementation of a monthly water quality monitoring program throughout the watershed, developed in coordination with other monitoring efforts.

- (e) The Council is developing a program to complement the VNRP that seeks to incorporate agricultural/livestock interests and small wastewater treatment plants into a voluntary agreement to control nutrient discharge to streams and rivers. The

Council offers technical and small-scale financial assistance, as well as working with State governments on modifications to existing regulations.

Table 2 Organizational Structure of the Tri-State Water Quality Council



Key elements in the Council's success to date include:

- Including all important stakeholders and allowing open public access to all meetings. Although a Council with 24 members is large, excluding important stakeholders is not feasible. Projects are supervised by subcommittees with more at stake in a given geographic area; but subcommittee members also have full standing in the Council.

- Strong representation of private interests and local governments vs. State and Federal employees on the Council. The private industry, local government industry, local government interests, and environmental groups drive the process.

- Council members tend to have major responsibilities and authority with their organizations (e.g. department heads for local government, private industry).

- Council members recognize that the collaborative process allows them to accomplish things that would be difficult or unpleasant or expensive to accomplish through regulations or litigation. However, they have not abandoned recourse to these options if collaboration fails.

- Delegation of project implementation to consultants, private firms, and local non-profit organizations allows the Tri-State Council to remain a small, low-budget organization.

- Dedicated independent facilitators who do not represent any stakeholder in particular, but who are committed to a fair process, and to the overall water quality goals (in this case facilitators are part of an NGO).

Weaknesses

- The Tri-State Council has a weak long-term funding base, with most funds coming from various EPA and State Dept. of Environmental Quality grants, and a small amount of private foundation funds.

- State government employees sometimes find it difficult to support recommendations for policy changes in their own organizations.

- The Federal agency (EPA) providing much of the grant funding has low credibility in some private industry areas (especially agriculture).

Annex F The Lerma- Chapala Basin

The Lerma River-Lake Chapala Basin is the leading example of Mexico's efforts to manage water resources during the past decade. Unlike the Mexican River Basin Commissions that were established in the 1940's and 1950's there is less focus on economic growth through the development of irrigation and more focus on water conservation and water quality in the basin. Eduardo Mestre provides an excellent summary description of the evolution of Mexican water policy as well as a description of the Lerma-Chapala experience.[90] His description serves as the basis for this section.

Mestre summarizes the development of Mexican water policy as follows: "Water is generally scarce in Mexico and this feature defines both its demographic and economic evolution patterns….Mexico's economic development model has influenced water utilization and has inspired the existing legal framework. In 1917, the Political Constitution of the United States of Mexico was enacted,

[90] J. Eduardo Mestre, "Integrated Approach to River Basin Management: Lerma-Chapala Case Study," WATER INTERNATIONAL V. 22, No. 3, Sept. 1997.

establishing among other quite interesting principles, that water is originally owned by the nation; hence, the federal government must provide its management. For all practical purposes, for the present, water cannot be privately owned. In 1926, the Federal Irrigation Law was published and the National Irrigation Commission was created, allowing water to play the strategic role of promoting regional development in vast areas of this country. In 1946, the Hydraulic Resources Secretariat (HRS) - a federal ministry, was created to be responsible of all activities concerning irrigation, river management, and control, as well as municipal water and wastewater works. Less importance was given to attaining a thorough water management policy; however, at that time water was still far from being scarce, with the exception of northern arid regions. A great technical tradition was born and capacity building favored an accelerated infrastructure development, supporting the high growth rates experienced during the fifties and sixties. From 1947 to 1960 HRS implemented several River Basin Executive Commissions, to promote hydraulic development. These commissions were inspired by similar organizations existing in the United States. They were government-run by a lone federal ministry having little interaction with water users or even with federal, state, and municipal authorities. Eventually, they evolved into powerful organisms that went far beyond water management, challenging existing state and regional political schemes. By 1977 all of them had disappeared. [why]

Urban, industrial, and tertiary economic activity growth during 1960-1980 strongly influenced water quality deterioration; furthermore, water demand soared and finally surpassed water availability in highly developed basins such as the Lerma River and the Valley of Mexico. Certain uses were displaced, mainly irrigated agriculture; this triggered water imports between basins. It became quite obvious that Mexico's rapid development required that specific hydraulic legislation be enacted; therefore, the Federal Water Law was enacted in 1972. In its time, this legal tool was considered a masterpiece, although in practical terms, law enforcement was almost nonexistent. At the end of 1976, a change of pace and scope was introduced by the Lopez-Portillo Administration, which provoked institutional turmoil when HRS disappeared and the Agriculture and Hydraulic Resources Secretariat (AHRS) - a federal ministry - took its place as the federal water authority. In political terms, water became a resource to promote agricultural activities. No policies were adopted to reduce aquifer overpumping and solve surface runoff rivalries among users. Furthermore, other competing uses such as industry and urban centers were left behind; this situation eventually triggered a fierce fight for water in many communities and micro-regions.

In 1989 the National Water Commission (NWC) was established as the sole federal water authority, institutionally located within AHRS. Its water management responsibilities comprised water distribution among users, federal water rights collection for water use and effluent discharge (a pseudotax similar to the French redevance and the Spanish canon, designed to raise money to partially fund the water sector) as well as hydraulic infrastructure planning, construction, and operation. Although clearly empowered to advance toward a better water management horizon, NWC dedicated itself to reducing the enormous gap between water supply and demand, both for agricultural and domestic uses. The seventies' legal framework required updating. In December 1992 the National Water Law (NWL) was enacted, and in January 1994 its corresponding regulations. These legal instruments clearly define roles for all key actors in the regional water scenario. They promote a wide and harmonious participation of state and municipal governments, water users, and society itself in water resources planning, management, and preservation. It also enforces a requirement that all legal users must have a title issued by NWC that clearly and legally states their rights to abstract, exploit, and utilize water for a specific social or economic activity. NWL provides a legal foundation to create river basin councils as a powerful tool to advance toward a modern and efficient water sector. Finally, it also promotes the water market, which allows water rights' transfers among users. Environmental deterioration in general, and water pollution as a specific key issue, forced the adoption of strategies and policies in an attempt to turn the tide, to solve problems, and to make compatible development objectives with environmental concerns. Thus, at the end of 1994, NWC became a part of the new Environment, Natural Resources, and Fishing Secretariat - a federal ministry. This is the first time the federal government has managed natural resources under global objectives to support - in practice - all theoretical approaches behind sustainable development."

The Lerma-Chapala Basin is one of the most important river basins in Mexico. It covers slightly more than two percent of Mexico's land mass but contains more than twelve percent of the irrigated farm land. More than 35 percent of the industrial GNP is produced within the basin. Within the basin per capita water availability is extremely limited -- there are less than a thousand cubic meters of water per person per year, a fifth of the national average. . Lake Chapala, the final basin reservoir, serves as the source of water for Guadalajara, Mexico's second largest city. However, in 1989 90 percent of the reservoir was classified as having unacceptable water quality for certain uses such as drinking water or fishing. A comprehensive diagnostic study that was completed in 1989 identified four

critical problems: water scarcity and "unsuitable" allocation, pollution, inefficiency of water use, and environmental degradation.

In order to deal with the water problems within the Lerma-Chapala basin, a Cooperative Agreement was signed among the Governors of the states of Guanajuato, Jalisco, Mexico, Michoacan and Queretero in April 1989 to develop a Joint Program for the Management of Water Use and Wastewater within the watershed. The objectives of this Cooperative Agreement were: (a) improved water quality; (b) management and regulation of water use to control water volume and make an equitable distribution among users; (c) more efficient use of water: and (d) management and conservation of the watersheds and water flows [within the Basin], through activities promoting increased water infiltration and aquifer recharge, retention of [azolves] and soil conservation. [91]

In 1990 a Consultative Council was created to follow-up on the 1989 Cooperative Agreement. In addition to the five state governments, the Consultative Council had representatives from the Secretariats of Agriculture and Water Resource, Fishing, Health, Public Finance, Social Development and the General Directorates of FertiMex, PEMEX, the Federal Electric Commission and the National Water Commission. In December 1992 this Consultative Council was converted into the Lerma-Chapala River Basin Council within the context of the [new] National Water Law.

The Lerma-Chapala River Basin Council was the first to be created in Mexico under the National Water Law which mandates the creation of such councils as coordination and consultative mechanisms among the National Water Commission, the federal, state and municipal governmental authorities and representatives of the users. It has as its objective "the formulation and implementation of programs and actions to improve regional water management, the development of hydraulic infrastructure and services, and the preservation of resources within the river basin…."[92]

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[91] See website of the Lerma-Chapala Basin Council for a chronology of the events related to the creation of the Council and implementation of activities. The URL is: http://sparc.ciateq.conacyt.mx~lermaham/consejo.htm.

[92] Mestre describes the principle function of River Basin Councils as a means to coordinate federal, state, and municipal dependencies and entities, and to negotiate with water users, River basin councils play a basic role since they are plural, open forums where existing problems are ventilated, and actions to be carried out are agreed upon for the benefit of river basins and their population, according to a previously accepted water agenda or …master water plan.

According to Mestre the Consultative Council had "created a Technical Work Group in 1989 that could meet on a more regular basis, with a straight forward agenda, to be held responsible for making things happen: negotiate resources; coordinate efforts; conciliate different positions; create legal instruments to support decisions, program, and actions; and define the treatment plant program, the surface runoff water allocation policy, and the approaches to enhance water efficiency. Soon, many activities were on their way and resources poured in from different sources…[A]ll. activities were originally government-run (federal and state government). However the experience in terms of multiple coordination, political will, financial instruments, and team spirit were very rich. Of course, many apparently insurmountable problems arose. Fortunately, differences in opinion, technical expertise, and political views ere always settled, either in group work sessions or by means of lobbying."[93]

The River Basin Council maintained the participation of the same governmental structures but added six representatives of different water user sectors. According to Mestre the water users have a General Assembly as well as work committees and subcommittees organized by water use and state. He states that: "its structure is very complex as are the interests that drive each water use. In every case each committee elects its representatives, and in turn the General Assembly elects six water users who will become official council members." The River Basin council has maintained the technical working group structure and established specialized support groups within it.

Annex G International Organizations and Networks related to Watershed/River Basin Management

Inter-American Water Resources Network. This network operates under the auspices of the Organization of American States. It maintains a directory of water resources professionals who are members of the its advisory council. Co-Chairs of the Advisory council for 2000 are Richard Meganck, OAS and Ricardo Anguizola Morales (ANAM General Administrator). It also maintains a water resources database. Its address is c/o OAS, Unit of Sustainable Development and Environment, 1889 F Street, Room 340, and Washington, D.C. 20006. The URL is http://www.iwrm.net.

[93] Mestre, "Integrated Management…"

International Latin American Network of River Basin Organizations. Its Permanent Technical Secretary is J. Eduardo Mestre. Its address is 211 Plateros Ave., col. Carretas, Santiago de Queretaro, Queretaro, Mexico. E-Mail Address is: tulipe@infosel.net.mx.

Network for Cooperation in Integrated Water Resource Management for Sustainable Development in Latin America and the Caribbean. Economic Commission for Latin America and the Caribbean, Natural Resources and Infrastructure Division. Casilla 179-D, Santiago, Chile. Publishes periodic newsletters on water resources management in Latin America. http://www.eclac.cl.